















**INTERNATIONAL UNION OF PURE  
AND APPLIED CHEMISTRY**

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PURE ET APPLIQUÉE**

**INFORMATION BULLETIN**

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**IUPAC SECRETARIAT:**

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1969

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(Excerpt from a letter written by Dr M. WILLIAMS, Oxford, to the printers)

### **IUPAC Information Bulletin No. 36**

I have pleasure in sending you a number of items for printing in the above Bulletin:

1. The new cover; Future Distribution of Information Bulletin and Comptes Rendus; Future Publication of the IUPAC Rules of Nomenclature, Symbols, Standards, etc.; Mechanism of Granting IUPAC sponsorship and IUPAC Subvention to Meetings. These four items were approved by the Executive Committee and Bureau during the recent Conference in Cortina d'Ampezzo.

Subsequently, they have been seen by the new President, Dr REES, and the Chairman of the IUPAC Editorial Advisory Board, Sir HAROLD THOMPSON, who are both anxious that these items be printed in the Bulletin as soon as possible.

### **FUTURE DISTRIBUTION OF "INFORMATION BULLETIN" AND "COMPTES RENDUS"**

At a meeting of the Bureau held in Cortina d'Ampezzo on 4 July 1969, following the recommendations of an *ad-hoc* Committee on Publications, it was agreed that

"Gratis copies of the above publications should be restricted to:

- (i) National Adhering Organizations and members of National Committees for Chemistry
- (ii) A number of academic chemists nominated by each National Adhering Organization (this list should be fairly small)
- (iii) Professional and learned societies, other than the National Adhering Organizations, that are concerned with chemistry, either completely or partially
- (iv) Titular and Associate Members and National Representatives
- (v) Company Associates

Organizations or individuals currently receiving the Bulletin and Comptes Rendus but not belonging to one of the above categories, should be asked to pay for these publications."

Distribution of the "Bulletin" and "Comptes Rendus" will commence on the above basis with Bulletin No. 37 and Comptes Rendus XXVth Conference. Organizations and individuals who will not be receiving gratis copies of these publications, may purchase copies from the IUPAC Secretariat.



## **FUTURE PUBLICATION OF IUPAC RULES OF NOMENCLATURE, SYMBOLS, STANDARDS, ETC.**

At a meeting of the Bureau held in Cortina d'Ampezzo on 4 July 1969, the following recommendations of an *ad-hoc* Committee on Publications were considered and approved:

### **Tentative Rules**

There are strong reasons for printing, in future, all tentative rules separately from the "Information Bulletin". Direct reproduction from the nomenclature manuscript presented for publication seems advantageous, since this document will have been re-worked several times within the relevant Commission and it should, therefore, be as nearly perfect as can be achieved.

Although printed separately from the Bulletin, tentative rules should be associated with it as a numbered series of Nomenclature Supplements or Appendices.

Distribution of tentative rules should be by the IUPAC Secretariat to National Adhering Organizations, other relevant national organizations, and special addresses supplied by the Nomenclature Commission concerned. Either, copies in bulk can be sent to an organization, or a single good copy from which the organization can itself reproduce copies.

Translation of tentative rules into other languages through National Adhering Organizations will be permitted, but such translations must be headed "Translated from . . ." and state that the original can be obtained from the IUPAC Secretariat.

A set of instructions should be presented to each Nomenclature Commission for preparing its tentative rules in a form best suited to direct reproduction.

### **Final Rules**

These should continue to be printed in "Pure and Applied Chemistry" and hard-cover reprints be available for sale from Butterworths.

For a trial period of two years, if they can do so more cheaply, National Adhering Organizations and appropriate national societies (but not commercial publishers) will be allowed to reprint final rules in their respective journals and/or produce reprints *after* Butterworths have published the final rules. Otherwise, such organizations should purchase bulk copies of final rules from Butterworths.

Translation of final rules into other languages through National Adhering Organizations will be permitted, but such translations must be headed "Translated from . . ." and state that the original can be obtained from the IUPAC Secretariat.

A routine mechanism will be established to enable National Adhering Organizations and appropriate national societies to order bulk copies of final rules from Butterworths.

H. W. THOMPSON

# MECHANISM OF GRANTING IUPAC SPONSORSHIP AND IUPAC SUBVENTION TO MEETINGS

## Sponsorship

Applications for sponsorship should normally be made two years in advance of the actual meetings, to the Executive Secretary, IUPAC Secretariat, Bank Court Chambers, 2/3 Pound Way, Cowley Centre, Oxford OX4 3YF, England.

(1) On receipt of an application, the Executive Secretary will send the Organizers an Advance Information Questionnaire.

(2) On receipt of the completed Questionnaire, the Executive Secretary will distribute copies to:

- (i) the Chairman of the Editorial Advisory Board and the Scientific Editor for a recommendation *re* publication of the proceedings of the meeting in "Pure and Applied Chemistry".
- (ii) the appropriate Division President(s) for advice *re* scientific standard of the meeting.

(3) On receipt of the advice of the Chairman of the Editorial Advisory Board, the Scientific Editor, and the Division President(s), the Executive Secretary will convey them to the Bureau (or Executive Committee), either by correspondence or at a meeting, if convenient, for a decision on the granting of sponsorship.

(4) On receipt of the decision on sponsorship, the Executive Secretary will prepare a letter, for signature by the Secretary General, conveying the decision to the Organizers. Copies of this letter will be sent to the relevant Division President(s), Chairman of the Editorial Advisory Board, Scientific Editor, and Messrs Butterworths.

(5) If sponsorship is granted, the Executive Secretary will prepare a letter, for signature by the President, drawing the attention of the Organizers and the Symposium Editor appointed by them, to their responsibilities *re* publication of the proceedings.

(6) If sponsorship is granted, Messrs Butterworths will contact the Symposium Editor for such details as are necessary to enable them to estimate the size and probable price of the publication based on the symposium, to draw up suitable publicity material, etc.

## Subvention

Requests for subvention to meetings granted sponsorship by IUPAC should be made to the Executive Secretary. Save in special circumstances, the granting of subvention will be limited to meetings which are to be held in non-Conference years.

(1) On receipt of a request, the Executive Secretary will ask the Organizers to supply a draft realistic budget.

(2) On receipt of the draft budget, the Executive Secretary will distribute copies to the Bureau (or Executive Committee) for its decision, which will normally be given only at a meeting of same and not by correspondence.



(3) On receipt of the decision on subvention, the Executive Secretary will prepare a letter, for signature by the Treasurer, conveying the decision to the Organizers.

(4) If subvention is granted, it may be obtained by the Organizers on writing to the Treasurer.

#### **Attendance at IUPAC-sponsored meetings**

At a meeting of the Executive Committee held in Cortina d'Ampezzo on 3 July 1969, it was

*Resolved:* to inform National Adhering Organizations, Division Presidents and others responsible for the organization of symposia and meetings under the auspices of IUPAC, that in considering the location of such meetings they should take all possible steps to ensure the freedom of all *bona fide* chemists to attend.



## INTRODUCTION

The experience made during the last two years makes it desirable to repeat the main points of the introduction published in the first Information Bulletin after the XXIVth Conference (1967, No. 30).

During the period between 1918 and 1938, the International Union of Pure and Applied Chemistry organized its Conferences each year. Consequently, the activity of IUPAC and its efficient work were continuously increasing.

After 1947, transportation by air changed fundamentally the possibilities of international meetings. The number of participants in the conferences increased rapidly, and so did the expenditure for transportation. IUPAC changed over to biennial meetings, with the Conferences and Congresses being held only in uneven Years. As pointed out in detail in a circular letter to the President and Secretary of all Divisions, Sections and Commissions, the two-year interval between IUPAC Conferences (dictated by economical and financial reasons) has the enormous drawback that work is no longer continuous but is generally interrupted by the two years "sleeping period". In the same circular letter, all officers of IUPAC were urged to overcome this gap, and this problem—by starting work immediately after each Conference, mainly by correspondence. Before such work can begin, it is essential that the exact composition of all IUPAC units be made known to everyone. Titular Members, Associate Members, and National Representatives must be selected and elected with great care. According to the Statutes, National Adhering Bodies must be informed about newly elected members of IUPAC and be given the right of veto. This is a valuable safeguard against wrong selections being made on the international level, but the cumbersome procedure involved delays commencement of work considerably.

This "Information Bulletin" therefore is published immediately after the XXVth Conference, giving a tentative picture of the composition of the Bureau and various Divisions, on the understanding that the National Adhering Bodies are still granted the privilege of veto in case they cannot approve the appointment of IUPAC members to the various working groups. I hope the National Adhering Bodies will understand the necessity of this early and tentative publication. The "Information Bulletin", as its name implies, gives tentative information and has to be considered as a tool for the establishment of the Comptes Rendus XXV which, in its final and approved form, will be published at the end of this year.

Another purpose of the "Information Bulletin" No. 36 consists in giving some information about the deliberations at the Conference in Cortina d'Ampezzo. I include therefore two reports, submitted for consideration by the Bureau, which recommend the creation of new units within IUPAC. Subsequently, Council approved the appointment of a Section on Medicinal Chemistry within the Organic Chemistry Division and an Inter-Divisional Committee on Machine Documentation in the Chemical Field. Your attention is also drawn to the future method of distributing the "Information Bulletin" and "Comptes Rendus" and of publishing IUPAC nomenclature rules.

R. MORF

# NAMES AND ADDRESSES OF THE BUREAU AND DIVISION COMMITTEES

*Excerpt from IUPAC Statutes and By-Laws*

“The choice of a Titular Member or an Associate Member by a Commission may take place either during a meeting of the Commission or by correspondence. The nomination shall then be submitted via the Division Committee to the Secretary General for approval by the Bureau or Executive Committee and by the Adhering Organization with which the nominee is connected. If approval by the latter be obtained or if no reply to the request for approval be received within four months, the Bureau or Executive Committee shall make a decision at its next meeting. In case of disapproval of the Adhering Organization, the nomination shall be deferred until the next Conference so that it may be submitted for examination of Council who shall take the final decision.”

The IUPAC Statutes require that the nominations of new Titular Members and Associate Members approved at the XXVth Conference, shall subsequently be approved by the respective National Adhering Organizations. The new names listed hereafter are given subject to this approval. Dates indicate when a person was first elected to the relevant IUPAC unit. Notification of any errors in the addresses, etc., should be conveyed in writing to the IUPAC Secretariat.

## **BUREAU 1969–1971**

### **Executive Committee**

Dr A. L. G. REES	(Australia)
Prof. J. BÉNARD	(France)
Prof. V. N. KONDRATIEV	(USSR)
Dr R. MORF	(Switzerland)
Prof. J. C. BAILAR, Jr	(USA)
Prof. J. LECOMTE	(France)
Prof. G. SARTORI	(Italy)
Sir HAROLD THOMPSON	(UK)

### *President*

1963–1971 REES, A. L. G., Dr  
CSIRO Chemical Research Laboratories,  
Division of Chemical Physics  
PO Box 160, Clayton, Victoria (Australia 3168)<sup>1</sup>

### *Past-President*

1961–1971 KONDRATIEV, V. N., Prof.  
Institute of Chemical Physics, USSR Academy of Sciences  
Vorobyevskoye chaussée 2-b, Moscow V-334 (USSR)

*Vice-President*

- 1969–1971 BÉNARD, J., Prof.  
Ecole nationale supérieure de Chimie  
Université de Paris  
11, rue Pierre-et-Marie-Curie, F-75 Paris 5<sup>e</sup> (France)

*Secretary General*

- 1956–1971 MORF, R., Dr  
PO Box 165, CH-8058 Zürich-Airport (Switzerland)

*Treasurer*

- 1963–1971 BAILAR, Jr, J.C., Prof.  
Department of Chemistry and Chemical Engineering  
University of Illinois  
Urbana, Illinois 61801 (USA)

*Elected Members*

- 1969–1973 ARNOLD, P.M., Mr  
Phillips Petroleum Company  
Bartlesville, Oklahoma 74003 (USA)
- 1969–1973 GENDRON, P.R., Dr  
Pulp and Paper Research Institute of Canada  
570 St.John's Road, Pointe Claire, P.Q. (Canada)
- 1969–1973 HEROUT, V., Prof.  
Institute of Organic Chemistry and Biochemistry  
Czechoslovak Academy of Sciences  
Fleming's Square 2, Prague 6 – Dejvice (Czechoslovakia)
- 1963–1971 LECOMTE, J., Prof.  
Membre de l'Institut  
6, rue de l'Alboni, F-75 Paris 16<sup>e</sup> (France)
- 1965–1973 MALISSA, H., Prof.  
Institut für Analytische Chemie und Mikrochemie der  
Technischen Hochschule Wien  
Getreidemarkt 9, A-1060 Wien (Austria)
- 1969–1973 RANGASWAMI, S., Prof.  
Department of Chemistry, University of Delhi  
Delhi-7 (India)
- 1967–1971 SARTORI, G., Prof.  
Istituto di Chimica generale ed inorganica, Università di Roma  
Piazzale delle Scienze 5, I-00100 Roma (Italy)
- 1967–1971 SHIBATA, S., Prof.  
Faculty of Pharmaceutical Sciences, University of Tokyo  
Bunkyo-ku, Tokyo (Japan)



1969–1973 SMETS, G., Prof.  
Laboratory of Macromolecular Chemistry, Université de Louvain  
96, rue de Namur, Louvain (Belgium)

1969–1973 SUOMALAINEN, H., Prof.  
The Finnish State Alcohol Monopoly (Alko)  
PO Box 10350, Helsinki 10 (Finland)

1963–1971 THOMPSON, Sir HAROLD  
St. John's College, Oxford (UK)

*Ex officio Members*

TRUHAUT, R., Prof.  
(Chairman of Co-ordinating Committee for Analytical Methods)  
Université de Paris, Faculté de Pharmacie, Chaire de Toxicologie  
4, avenue de l'Observatoire, F-75 Paris 6<sup>e</sup> (France)

THOMPSON, Sir HAROLD  
(Chairman of Editorial Advisory Board)  
St. John's College, Oxford (UK)

*Division Presidents*

*Physical Chemistry (I)*

1969–1973 WADDINGTON, G., Dr  
Division of Chemistry and Chemical Technology,  
National Research Council  
2101 Constitution Avenue, Washington, DC 20418 (USA)

*Inorganic Chemistry (II)*

1969–1973 GLEMSER, P., Prof.  
Anorganisch-Chemisches Institut der Universität Göttingen  
Hospitalstrasse 8–9, D-34 Göttingen (Germany)

*Organic Chemistry (III)*

1969–1971 BARTON, D.H.R., Prof.  
Department of Chemistry, Imperial College of Science and Technology  
Imperial Institute Road, London SW 7 (UK)

*Macromolecular Division (IV)*

1967–1971 WICHTERLE, O. Prof.  
Institute of Macromolecular Chemistry  
Czechoslovak Academy of Sciences  
Prague 6 – Petřiny (Czechoslovakia)

*Analytical Chemistry (V)*

1969–1973 KEMULA, W., Prof.  
Instytut Chemii Fizycznej Polskiej Akademii Nauk  
Ul. Kasprzaka 44/52, Warszawa 42 (Poland)

*Applied Chemistry (VI)*

- 1967–1971 GALLAY, W., Dr  
The E. B. Eddy Company  
Hull, P. Q. (Canada)

**I PHYSICAL CHEMISTRY DIVISION**

**Division Committee**

**Titular Members**

*President*

- 1963–1973 WADDINGTON, G., Dr  
Division of Chemistry and Chemical Technology,  
National Research Council  
2101 Constitution Avenue, Washington, DC 20418 (USA)

*Past-President*

- 1959–1973 MELVILLE, Sir HARRY  
Queen Mary College  
Mile End Road, London E1 (UK)

*Vice-President*

- 1965–1973 OVERBEEK, J. Th. G., Prof.  
Van't Hoff Laboratorium der Rijks-Universiteit  
Sterrenbos 19, Utrecht (Netherlands)

*Secretary*

- 1969–1973 JONES, R. N., Dr  
Division of Pure Chemistry, National Research Council of Canada  
Ottawa 7, Ontario (Canada)

*Members*

- 1969–1973 FRANCK, E. U., Prof.  
Institut für Physikalische Chemie und Elektrochemie der  
Universität Karlsruhe  
Kaiserstrasse 12, D-75 Karlsruhe (Germany)
- 1969–1973 JORDAN, J., Prof.  
212 Whitmore Laboratory, Pennsylvania State University  
University Park, Pennsylvania 16802 (USA)
- 1969–1973 MCGLASHAN, M. L., Prof.  
Department of Chemistry, University of Exeter  
Stocker Road, Exeter, Devon (UK)

1965–1973 PRETTRE, M., Prof.  
Institut de Recherche sur la Catalyse  
30, bd de l'Hippodrome, Villeurbanne, Rhône (France)

1967–1971 STULL, D. R., Dr  
Dow Chemical Co., 1707 Building  
Midland, Michigan 48640 (USA)

1969–1973 SUNNER, S., Prof.  
Chemical Centre, Thermochemistry, University of Lund  
PO Box 740, S-22007 Lund 7 (Sweden)

#### **Associate Member**

1969–1971 VEDENEV, V. I., Dr  
Institute of Chemical Physics, USSR Academy of Sciences  
Vorobyevskoye chaussée 2-b, Moscow V-334 (USSR)

## **II INORGANIC CHEMISTRY DIVISION**

### **Division Committee**

#### **Titular Members**

##### *President*

1963–1973 GLEMSER, O., Prof.  
Anorganisch-Chemisches Institut der Universität Göttingen  
Hospitalstrasse 8–9, D-34 Göttingen (Germany)

##### *Past-President*

1955–1971 DE BOER, J. R., Prof.  
Scientific Council for Nuclear Affairs  
PO Box 5086, Duinweg 24, The Hague (Netherlands)

##### *Vice-President*

1959–1971 GUTMANN, V., Prof.  
Institut für Anorganische Chemie der Technischen Hochschule Wien  
Getreidemarkt 9, A-1060 Wien (Austria)

##### *Secretary*

1965–1973 COLLONGUES, R., Prof.  
Ecole nationale supérieure de Chimie, Université de Paris  
11, rue Pierre-et-Marie-Curie, F-75 Paris 5<sup>e</sup> (France)

##### *Members*

1969–1973 HORTON, W. S., Dr  
National Bureau of Standards  
Washington, DC 20234 (USA)



1967–1971 JENSEN, K.A., Prof.  
Kemisk Laboratorium II, H.C. Ørsted Institutet  
Universitetsparken 5, DK-2100 Copenhagen Ø (Denmark)

1969–1973 MALATESTA, L., Prof.  
Istituto di Chimica generale dell'Università  
Via G. Venezian 21, I-20133 Milano (Italy)

1967–1971 NYHOLM, Sir RONALD  
Department of Chemistry, University College  
Gower Street, London WC 1 (UK)

1967–1971 SPACU, P., Prof.  
Faculty of Chemistry, University of Bucharest  
Splaiul Independentei 89, Bucharest 6 (Romania)  
(1 vacancy to be filled)

### III ORGANIC CHEMISTRY DIVISION

#### Division Committee

##### Titular Members

##### *President*

1963–1971 BARTON, D.H.R., Prof.  
Department of Chemistry, Imperial College of Science and Technology  
Imperial Institute Road, London SW 7 (UK)

##### *Past-President*

1963–1971 BARTLETT, P.D., Prof.  
Department of Chemistry, Harvard University  
12 Oxford Street, Cambridge, Massachusetts 02138 (USA)

##### *Vice-President*

1961–1971 OURISSON, G., Prof.  
Institut de Chimie, Université de Strasbourg  
Esplanade, F-67 Strasbourg (France)

##### *Secretary*

1962–1971 KJAER, A., Prof.  
Department of Organic Chemistry, Technical University of Denmark  
Building 201, DK-2800 Lyngby (Denmark)

##### *Members*

1965–1973 HEROUT, V., Prof.  
Institute of Organic Chemistry and Biochemistry  
Czechoslovak Academy of Sciences  
Fleming's Square 2, Prague 6 – Dejvice (Czechoslovakia)

- 1969–1973 NAKASHIMA, M., Prof.  
Department of Chemistry, University of Kyoto  
Kyoto (Japan)
- 1969–1973 ROMO, J., Prof.  
Instituto de Química, Universidad Nacional Autónoma de México  
México 20, DF (México)
- 1967–1971 SHEMYAKIN, M. M., Prof.  
Institute for Chemistry of Natural Products, USSR Academy of Sciences  
U1. Vavilova 18, Moscow V-312 (USSR)
- 1967–1971 YATES, P., Prof.  
Department of Chemistry, University of Toronto  
Toronto (Canada)
- 1965–1973 ZOLLINGER, H., Prof.  
Chemisches Institut der Universität Zürich  
Rämistrasse, Zürich (Switzerland)

## **SECTION ON MEDICINAL CHEMISTRY**

### **Titular Members**

#### *Chairman*

Prof. E. CAMPAIGNE (USA)

#### *Secretary*

Dr A. I. RACHLIN (USA)

Prof. A. ALBERT (Australia)

Prof. E. J. ARIENS (Netherlands)

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Dr F. L. ROSE (UK)

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Prof. M. PROTIVA (Czechoslovakia)

Dr L. STERNBACH (USA)

Prof. T. URBANSKI (Poland)

## **IV            MACROMOLECULAR DIVISION**

### **Division Committee**

#### **Titular Members**

##### *President*

- 1967–1971 WICHTERLE, O., Prof.  
Institute of Macromolecular Chemistry  
Czechoslovak Academy of Sciences  
Prague 6 – Petřiny (Czechoslovakia)

##### *Vice-President*

- 1967–1971 BENOIT, H., Dr  
Centre de Recherches sur les Macromolécules  
6, rue Boussingault, F-67 Strasbourg (France)

##### *Secretary*

- 1967–1971 SMETS, G., Prof.  
Laboratory of Macromolecular Chemistry, Université de Louvain  
96, rue de Namur, Louvain (Belgium)

##### *Members*

- 1968–1971 BARRETT, J. W., Dr  
Monsanto Chemicals Ltd.  
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- 1967–1971 BAWN, C. E. H., Prof.  
Department of Inorganic and Physical Chemistry,  
University of Liverpool  
Liverpool 3 (UK)
- 1969–1971 COSSEE, P., Dr  
Koninklijke/Shell-Laboratorium  
Badhuisweg 3, Amsterdam-N (Netherlands)
- 1968–1971 HORN, O., Prof.  
Farbwerke Hoechst AG  
D-6230 Frankfurt/Main-Höchst (Germany)
- 1967–1971 MEDVEDEV, S. S., Prof.  
USSR Academy of Sciences  
Leninskii Prospekt 14, Moscow V-71 (USSR)
- 1967–1971 OKAMURA, S., Prof.  
Department of Polymer Chemistry, Kyoto University  
Yoshida-machi, Sakyo-ku, Kyoto (Japan)
- 1967–1971 OVERBERGER, C. G., Prof.  
Department of Chemistry, University of Michigan  
Ann Arbor, Michigan 48104 (USA)



- 1967-1971 SCHULZ, G.V., Prof.  
Institut für Physikalische Chemie, Universität Mainz  
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(1 vacancy to be filled)

#### **Associate Members**

- 1967- BUECH, A.M., Dr  
General Electric Company  
PO Box 1088, Schenectady, New York (USA)
- 1969- CAIRNS, R.W., Dr  
Hercules Inc.  
Wilmington, Delaware 19899 (USA)
- 1969- KARGIN, V.A., Prof.  
V.L. Karpov Research Institute of Physical Chemistry  
Ul. Obukha 10, Moscow V-120 (USSR)
- 1969- KLINE, G.M., Dr  
National Bureau of Standards  
331 South Palmway, Lake Worth, Florida 33460 (USA)
- 1967- LETORT, M., Prof.  
35, rue St-Dominique, F-75 Paris 7<sup>e</sup> (France)
- 1969- MELVILLE, Sir HARRY  
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Mile End Road, London E 1 (UK)
- 1967- NATTA, G., Prof.  
Istituto di Chimica industriale del Politecnico  
Via Mario Pagano 54, Milano (Italy)
- 1967- SAKURADA, I., Prof.  
Institute for the Chemistry of Cellulose, University of Kyoto  
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#### **National Representatives**

- Australia SOLOMON, D.H., Dr  
CSIRO, Division of Applied Mineralogy  
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- Bulgaria PANAYOTOW, I.M., Dr  
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- Denmark BJÖRKMAN, A., Prof.  
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- Finland SIHTOLA, H., Dr  
Finnish Pulp and Paper Research Institute  
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- France DE VRIES, J., Dr  
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- Germany ENGEL, F., Dr  
Chemische Werke Huls  
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- Hungary HARDY, G., Dr  
Research Institute of the Plastics Industry  
Hungária körút 114, Budapest XIV (Hungary)
- TÜDÖS, F., Dr  
Central Research Institute for Chemistry  
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Pusztaszeri út 59/67, Budapest II (Hungary)
- Israel SILBERBERG, A., Prof.  
Weizmann Institute of Science  
Rehovoth (Israel)
- Japan IWAKURA, Y., Prof.  
Department of Synthetic Chemistry, University of Tokyo  
Hongo, Bunkyo-ku, Tokyo (Japan)
- Netherlands STAVERMAN, A.J., Prof.  
Chemische Laboratoria der Rijks-Universiteit  
PO Box 75, Leiden (Netherlands)
- Norway UGELSTAD, J., Prof.  
Technical University of Norway  
Trondheim (Norway)
- Poland TURSKA, E., Prof.  
Department of Physical Chemistry of High Polymers,  
Polytechnic Institute of Lodz  
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- Sweden RÅNBY, B., Prof.  
Royal Institute of Technology  
Stockholm 70 (Sweden)
- South Africa JOUBERT, F.J., Dr  
c/o South Africa Committee for IUPAC,  
South African Council for Scientific and Industrial Research  
PO Box 395, Pretoria (South Africa)
- UK MELVILLE, Sir HARRY  
Queen Mary College  
Mile End Road, London E 1 (UK)

USA      BAILEY, W.J., Prof.  
Department of Chemistry, University of Maryland  
College Park, Maryland 20742 (USA)

**Representative of IUPAB**

SCHERAGA, H.A., Prof.  
Department of Chemistry, Cornell University  
Ithaca, New York 14850 (USA)

**Representative of IUPAP**

WOLF, K.A., Prof.  
Ludolf-Krehl-Strasse 31 A, Heidelberg (Germany)

**V      ANALYTICAL CHEMISTRY DIVISION**

**Division Committee**

**Titular Members**

*President*

1965–1973    KEMULA, W., Prof.  
Instytut Chemii Fizycznej Polskiej Akademii Nauk  
Ul. Kasprzaka 44/52, Warszawa 42 (Poland)

*Vice-President*

1959–1971    WEST, P.W., Prof.  
Coates Chemical Laboratories, Louisiana State University  
Baton Rouge, Louisiana 70803 (USA)

*Secretary*

1967–1971    FENNELL, R.W., Mr  
Materials Department, Royal Aircraft Establishment  
Farnborough, Hampshire (UK)

*Members*

1967–1971    ALIMARIN, I.P., Prof.  
V.I. Vernadsky Institute of Geochemistry and Analytical Chemistry  
Vorobyevskoye chaussée 47-a, Moscow V-334 (USSR)

1967–1971    BELCHER, R., Prof.  
Department of Chemistry, University of Birmingham  
PO Box 363, Birmingham 15 (UK)



- 1967–1971 DUVAL, C., Prof.  
Laboratoire de Recherches micro-analytiques  
11, rue Pierre-et-Marie-Curie, F-75 Paris 5<sup>e</sup> (France)
- 1967–1971 ERDEY, L., Prof.  
Institute for General Chemistry, Technical University  
Géllert tér 4, Budapest XI (Hungary)
- 1969–1973 FISCHER, W., Prof.  
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# ANALYTICAL METHODS FOR THE STUDY OF AIR POLLUTION<sup>1</sup>

(Introductory Remarks)

By PHILIP W. WEST

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The problems of environmental pollution have attracted the attention of the world's scientific community and have become of major concern to the general population. The problems are essentially chemical in origin and their study, control and ultimate elimination depend substantially on the efforts of the chemists and especially on the contributions of analytical chemistry. It is to be admitted that many disciplines are involved in the evaluation and control of air pollution. The life sciences, including medicine, have great responsibility because environmental health, together with damage to vegetation, is of vital importance. The engineers feel that the prevention or minimizing of pollution must be solved through engineering techniques. The climatologists and meteorologists feel that air pollution is of special concern to them because knowledge of their fields is of critical importance in predicting unusual periods of inversion and wind movements which may determine the intensity and distribution of air pollution. Without the identification and quantitative measurements of individual pollutant species, however, a true evaluation of air pollution is not possible. Likewise, the control and the ultimate reduction in air pollution must involve analytical monitoring of point sources as well as the ambient atmosphere for the determination of pollutant concentrations.

An appeal is hereby made for the services of the most talented analytical chemists in the scientific community. For example, the analytical chemists who serve in various capacities in the International Union of Pure and Applied Chemistry are needed, together with their colleagues, to provide the expertise required to introduce unique and advanced methods for determination of pollutants. Many of the analytical methods now being used in air pollution studies are shockingly obsolete and crude. In fact, many determinations are made which are reported in terms of a given species while, in fact, the methods only measure some general property which is possessed not only by the species in question but is also possessed by many potential interfering substances. The analytical methods employed must be extremely sensitive and highly reliable if real progress is to be made in the solving of pollution problems, and in particular, the problems of polluted air. Measurements of pollutants must apply to materials present in the parts per million and parts per billion ranges. The absolute amount of material to be detected and determined may vary from microgram to nanogram and even to picogram quantities. Methods must be applicable for the evaluation of organic as well as inorganic substances which may be in the form of solids, liquids, or gases.

<sup>1</sup> Plenary Lecture presented at the International Symposium on Analytical Chemistry, Birmingham, England, July 1969.



The challenge of air pollution studies becomes apparent when it is realized that minute traces of pollutants may be significant even though their effects may not be apparent except through statistical evaluations of changes noted after months or even years of exposure. Some pollutants may not have significant effects themselves, but their metabolites may be of critical importance. Conversely, some pollutants may have little significance when present by themselves, but may have harmful properties when present in certain mixtures because of synergistic effects. In this regard, it may be of interest to note that sulfur dioxide has been the principal pollutant known to be present in each of the major air pollution disasters. In spite of the fact that hundreds of lives were lost during these episodes, the levels of  $\text{SO}_2$  found to be present in each case, were well under concentrations known to be hazardous. In each of the episodes, however, the  $\text{SO}_2$  was present along with high concentrations of airborne particulates such as  $\text{NaCl}$ ,  $\text{Al}_2\text{O}_3$ , and soot, may very well have been present and caused the effective concentration of  $\text{SO}_2$  to be greatly amplified through its adsorption on particulate surfaces. Unfortunately, relatively little is known regarding the identity of the particulate species that were present and nothing is known regarding the state of the  $\text{SO}_2$ , whether it existed as the free gas or whether it was concentrated on the particulates.

The analytical chemistry applied to the study of air pollution is rapidly becoming quite sophisticated in comparison to the crude methods of gravimetry and titrimetry, that have been used in the past. Gravimetric methods are seldom used now except for the determination of total mass of fall-out dusts or the total mass of airborne particulates collected by means of high volume samplers that are used to filter solid material from large volumes of air. Titrimetry is rapidly being replaced by more sensitive, rapid and reliable techniques, although, coulometry finds valuable applications, especially in certain continuous monitoring instruments.

The analytical techniques now finding widespread applications include gas chromatography, infrared spectroscopy, fluorometry, spectrophotometry, atomic absorption spectroscopy, potentiometry with ion selective electrodes, catalyzed and induced reactions and ring oven techniques. In addition to these, special applications may require the use of such tools as the electron microprobe, X-Ray fluorescence, chemiluminescence, thin layer chromatography, polarized light microscopy, dispersion staining and neutron activation.

Although sulfur dioxide has long been considered to be of critical importance, there are still a number of laboratories that determine it by relatively unselective iodimetric or conductimetric measurements. The so-called WEST-GAEKE [1] procedure is now becoming widely used as the definitive method for  $\text{SO}_2$  determination because it is essentially specific, sensitive, rapid and reliable. It has the unique advantage that it affords efficiency in sampling and stabilizing in the sulfur dioxide. The sample is scrubbed in a trapping solution of tetrachloromercurate (II), whereby the  $\text{SO}_2$  is isolated in the form of the remarkably stable dichlorosulfitomercurate (II) complex. The final estimation of the isolated  $\text{SO}_2$  is obtained by means of a spectrophotometric procedure based on the color developed between the sulfito complex, acid-bleached pararosaniline and formaldehyde. The critical step is that of sampling because simple scrubbing of the air sample in water or dilute alkali, may result in destruction of  $\text{SO}_2$  present due to reaction with reducing or oxidizing agents which may co-exist with it in the ambient atmosphere but react with it in aqueous systems. The complexation

approach for sample isolation prevents air oxidation or other changes from taking place until actual measurement of the  $\text{SO}_2$  can be accomplished.

It is to be hoped that future developments will permit the direct determination of sulfur dioxide in the ambient atmosphere without the necessity of sampling. It is quite possible that flame techniques may enable the spectroscopic determination of  $\text{SO}_2$ , or that laser beams may be utilized for remote monitoring of  $\text{SO}_2$  levels [2].

Although hydrogen sulfide is one of the most disagreeable and obvious pollutants, there is still much to be desired regarding analytical methods for its measurement. Detector tubes impregnated with silver cyanide or paper tapes impregnated with lead acetate are widely used but cannot be considered entirely satisfactory for precise studies. Procedures based on the synthesis of methylene blue are likewise lacking in convenience and precision. Even worse, is the situation regarding sulfates and sulfuric acid aerosols. It is obvious that accurate methods are needed for determining each of the oxidation states if the sulfur cycle is to be evaluated and controlled. Especially in the case of sulfuric acid aerosols, dependable methods having high sensitivity, are badly needed for studies of its health effects. Turbidimetric and nephelometric methods are used, but the methods lack sensitivity, reliability, and precision.

Fluoride is one of the major air pollutants, particularly in the form of hydrogen fluoride and hydrofluoric acid. As little as one part per billion of fluoride may cause serious damage to vegetation, and for this reason, fluoride emissions may cause great economic losses in agricultural areas. Some years ago, BELCHER and his co-workers [3] introduced the first fluoride reagent that yields a positive color formation through reaction with fluoride. Lanthanide salts formed by reaction with alizarin complexan react with fluoride to form a red complexan and the reaction is both sensitive and highly selective. This contribution has been of great value in fluoride studies, although a major problem still exists because of interfering reactions that take place during sampling procedures. It must be recognized that hydrogen fluoride can exist in the ambient atmosphere together with common pollutants such as calcium, lead, manganese, iron, and aluminum salts. In isolating the fluoride for subsequent analysis, however, it is necessary to trap it in aqueous systems, whereby other pollutants are also trapped and reaction takes place which results in the formation of such species as lead fluoride, hexafluoroaluminate and hexafluoroferrate (III). Some laboratories have tried to solve the problem by means of Willard-Winter Distillation procedures but these are cumbersome and introduce a number of sources of error. Microdiffusion techniques hold promise [4] and more recently, a method has been introduced whereby the samples are swept through hot concentrated sulfuric acid which traps the potential interfering species but permits the fluorides to pass through in the form of hydrogen fluoride, which is subsequently trapped and determined with the alizarin complexan reagent.

The oxides of nitrogen are major pollutants which still resist easy study. Most determinations are carried out on the equilibrium species nitrogen dioxide which is determined by means of the classic Griess reaction involving diazotization, together with coupling to form an intensely colored reaction product. More direct means for determining each species of the oxides of nitrogen are badly needed.

To emphasize the need for analytical methods, the problem of ozone determination is cited. Although ozone is a pollutant of great significance, its determination has been a major problem. One method has involved the use of rubber bands whereby



the ozone is estimated through its reaction with the rubber to form cracks. Although this method is crude, it does have the merits of being relatively selective. Most determinations have been run, however, using iodometric procedures. Because of a number of oxidants normally present in the air besides ozone, these procedures can hardly be considered satisfactory.

Although airborne particulates comprise a major portion of the air pollution problem, relatively little has been done to determine their true nature. The simple determination of fall-out or the measurement of the mass of airborne particulates should be considered only as a preliminary step. A true evaluation of particulates, should include the identification and determination of individual species which go to make up the total dust burden. As often as possible, it would also be helpful to know the size distribution of the particles. Although, emission spectroscopy has been used and is certainly a valuable technique for qualitative and quantitative analysis, it does have limitation because of its cost and because a relatively high degree of skill is required of the spectroscopist for quantitative results to be accurate. Fortunately, the development of atomic absorption spectroscopy now provides a very reliable and relatively simple approach for quantitative determination of most significant metal pollutants. Furthermore, quantitative ring oven procedures are becoming available for the identification and determination of airborne particulates and these provide a cheap, reliable, and remarkably simple method for air pollution studies [5].

In this appeal for technical talent, two items of special interest should be mentioned. One of the problems that has held back the development of analytical methods for the study of environmental pollution, has been that of verifying the effectiveness of various procedures that are developed. One of the most basic approaches to be used in establishing recommended procedures is to have inter-laboratory studies made on selected methods so that comparisons can be made regarding the relative complexity, cost, speed, precision, accuracy, and general reliability of the proposed methods. The ideal approach is to distribute common standard reference samples to the cooperating laboratories and then to evaluate statistically the results obtained and note the comments submitted by the respective groups. Even for gaseous samples, it is difficult to provide standard test materials of known concentrations that are stable and of known composition. Even more difficult is the distribution of representative samples of particulate materials. The permeation tube technique has provided a convenient and generally satisfactory method for standardizing certain gaseous pollutant methods [6]. Unfortunately, the technique is not applicable for all gases, ozone being one of the important pollutants that cannot be handled in this way. Hopefully, as more workers become active in air pollution studies, other approaches will be introduced for providing standard test materials.

As a final observation, but certainly not the least important, attention is directed to the matter of pollutant sinks. It is obvious that pollutants have been introduced into the atmosphere for centuries and that given enough time, they disappear. There is still little known about the ultimate fate, at least of gaseous pollutants and much work needs to be done to determine the chemical and physical changes that take place during the life history of individual species. It is possible that where a series of reactions take place during the ultimate life of a pollutant, some rate-determining step may be found that can be circumvented or catalyzed so that the total sink process can be speeded up and the atmosphere thus improved more quickly.



Most authorities feel that the quality of the air is deteriorating rapidly and that the situation is critical. A number of areas are known where air pollution is already intolerable and the situations may be world wide within 25 to 30 years. Without question, the problem is challenging and urgently requires the combined efforts of scientists throughout the world.

### *Literature*

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- 3 BELCHER, R./LEONARD, M.A./WEST, T.S.: Chem.Soc. 3577 (1959)
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# REPORT OF IUPAC AD-HOC COMMITTEE ON MEDICINAL CHEMISTRY

*Cortina d'Ampezzo (Italy), 4 July 1969*

## A. *Formation of committee and method of operation*

In a letter dated 15 February 1969, the persons named below were informed that the Executive Committee of IUPAC had resolved that "an *ad-hoc* Committee to study the possible setting up of a section on Medicinal Chemistry by IUPAC be appointed, the composition to be Prof. E. CAMPAIGNE (Convenor), Prof. V. A. YAKOVLEV and Dr L. STERNBACH". By 1 April agreement to serve on the Committee had been received from all appointees, and the Committee members had agreed to complete their deliberations by mail, after first consulting a number of colleagues.

A total of twenty-six medicinal chemists were consulted by Dr STERNBACH and the writer. While these are largely American colleagues, an effort was made to obtain diverse opinion, so that the consultants were international and both academic and industrial. Medicinal chemists in Canada, England, Australia, New Zealand and France were contacted. Twelve of the consultants were in the pharmaceutical industry, twelve were academic, one retired and one from governmental research.

In his acceptance letter Prof. YAKOVLEV indicated his support for the establishment of a Medicinal Chemistry Section, and that he would consult with colleagues and send his considered opinions. At the time of writing this report (6 June) we have not heard further from Prof. YAKOVLEV. Since the Committee has not had time to meet to discuss these matters, the following comments, while greatly influenced by the opinions of various correspondents, are the sole responsibility of the reporter, and may not reflect accurately the opinions of the other Committee members.

## B. *Frame of reference of the ad-hoc committee*

A decision to include Medicinal Chemistry within the objectives of IUPAC requires a clear definition of Medicinal Chemistry, and some knowledge of its recent development. Medicinal Chemistry is concerned with the synthesis, isolation and study of compounds of potential or established biological activity of medical interest, and with the study of metabolic products of drugs, including the synthesis of such metabolites. The main goal of Medicinal Chemistry is to elucidate the mechanism of action of drugs. Therefore there is an inevitable overlapping with organic chemistry, pharmacology and biochemistry, but scientists in these disciplines *per se* are not, on the whole, interested in the relationship between molecular structure and drug action, which is the principal concern of the medicinal chemist. Therefore any contributions to stereochemistry, relations to receptor sites and binding, and predictions of medicinal activity on the basis of biochemistry happenings are in the realm of Medicinal Chemistry. A major possibility for Medicinal Chemistry of the future depends on the

physical chemists, who have recently developed mathematical models for the correlation of physical and biological properties in related structures, thereby allowing the prediction of medicinal activity in compounds as yet unknown.

So far as we can determine, the oldest organization devoted solely to the interest of the medicinal chemist is the Division of Medicinal Chemistry of the American Chemical Society. This Division was established in 1909, "for the promotion of research in the discovery and development of new medicinal agents, and by its meetings, professional contacts, reports, papers, discussions, and publications to encourage the advancement and diffusion of knowledge of the chemistry and biological activity of substances useful in medicine" (Art. I, Sect. 2, Bylaws of the Division of Medicinal Chemistry, A.C.S.).

The need for such organizations is clear. Recently the Société de Chimie thérapeutique was formed, and later (1966) a group in England with similar objectives formed the Society for Drug Research. Early this year (March, 1969) representatives of these latter two groups, the Società italiana de Scienze farmaceutiche and individuals from Belgium, Holland and Germany met to form the "European Committee on Medicinal Chemistry", with the objectives of advancing research in the field, promoting international relations between groups interested in Medicinal Chemistry, and furthering international exchange of information in this field. The general secretary is Dr J. THUILLIER, of France.

There are several publications devoted exclusively to Medicinal Chemistry *per se*. Among these are "Journal of Medicinal Chemistry", sponsored by the Division of Medicinal Chemistry of the American Chemical Society, currently in Vol. 12, and the journal "Chimie thérapeutique", sponsored by the Société de Chimie thérapeutique, currently in Vol. 4. "Advances in Drug Research" appears annually in Britain.

### C. *Other international organizations with related interests*

Before recommending the establishment of yet another administrative organization, one should consider whether present international organizations adequately represent Medicinal Chemistry. Within the International Council of Scientific Unions (ICSU), the International Union of Physiological Sciences (which has a Liaison Committee of Physiology and Pharmacology) may be concerned with standardization of biological methods of screening, and related pharmacological techniques of interest to medicinal chemists. Also the International Union of Biochemistry would undoubtedly be concerned with standardization of methods of biological degradation and drug metabolism studies. Certainly within IUPAC itself, the Section on Toxicology in the Division of Applied Chemistry is concerned with definitions of toxicity and methods of analysis for drugs and drug metabolites in biological systems.

Other groups within ICSU with possible interest in Medicinal Chemistry are the International Union of Biological Sciences (Microbiology?) and the International Union of Pure and Applied Biophysics. There is also an International Union of Pharmacology, not yet a member of ICSU with provision for sectional membership in Medicinal Chemistry or Pharmaceutical Chemistry. Drug standards and standard methods of drug analysis and nomenclature are also dealt with by the World Health Organization, working through individual government pharmacopoeia committees.



#### D. *Recommendation*

In the opinion of all members of the *ad-hoc* Committee, and a majority of the consultants, the scientific chemical aspects of Medicinal Chemistry can best be served internationally by IUPAC. However, those in favor unanimously felt that a real and distinct place for Medicinal Chemistry within IUPAC should be created, and we therefore recommend that a Division of Medicinal Chemistry be provisionally created for a limited time. At the end of the provisional time, the activities of the Division should be reviewed by Council, to determine whether the stated objectives have been or are being accomplished, and are within the proper purview of IUPAC.

Such a Division should initially concentrate on the scientific aspects of Medicinal Chemistry, attempt to further international relations in the field, and promote personal relations between researchers and further exchange of scientific information. Problems of international standards of biological activity, generic drug names, purity control, drug analysis, etc., should initially be handled by the establishment of special liaison committees, who should determine the nature of these problems and how they are handled by other international bodies. In this way unnecessary duplication of effort may be avoided, and the Division of Medicinal Chemistry of IUPAC could concentrate on problems and objectives of medicinal chemists.

#### E. *Objectives of a division of medicinal chemistry in IUPAC*

The importance of Medicinal Chemistry for the human world community cannot be overemphasized, and the role of the chemist in human health should be recognized by the creation of a Division of Medicinal Chemistry within IUPAC. The objectives of such a division are:

- (1) to promote the international exchange of information in the field by joint meetings with member countries to unify international medicinal chemical work;
- (2) to promote cooperation between medicinal chemists and related disciplines in all member countries to base firmly the major medicinal areas on standard screening methods, biological assays, metabolite comparisons and drug analysis;
- (3) to cooperate with other international organizations which deal with the various aspects of medicinal chemistry;
- (4) to advance research in the field of medicinal chemistry by promoting international congresses, publications, and personal relations among scientists within the discipline.

#### F. *Some final comments*

IUPAC has in the past sponsored several meetings of direct interest to medicinal chemists. For example, the Organic Division cosponsored a symposium on purine analogs at Prague a few years ago which was well received. The Natural Products Symposia, while strictly organic oriented, have been of interest to medicinal chemists. Last year a meeting of Medicinal Chemistry in Münster was cosponsored by IUPAC. However, some of the medicinal chemists who attended felt that the papers were of uneven quality, and have suggested that a divisional committee within IUPAC would be in a better position to maintain the usual standards of IUPAC meetings. The first International Symposium on Rational Development and Application of Drugs



will soon meet (7–10 July) in Nijmegen (Netherlands), convened by Prof. E.J. ARIENS, of the University of Nijmegen. I am not clear on sponsorship of this meeting, but the quality of the speakers and titles indicate an excellent scientific conference.

If Council should decide not to create a Division of Medicinal Chemistry, but creates instead a Section of Medicinal Chemistry, the Committee does not at this time have a recommendation as to whether such a section should be attached to the Division of Organic Chemistry, the Division of Applied Chemistry, or jointly to both of these Divisions. The opinion of the consultants was nearly equally divided on this matter, but in general it was felt that a Section with split administrative responsibility would be unwieldy. Cogent reasons were advanced for affiliation with either Division, but in nearly all cases these were advanced only if creation of a separate Division were impossible.

Most medicinal chemists are more interested in the scientific aspects of this discipline than in problems of analysis, standardization and codification. They also feel that problems of drug purity, pharmacological and toxicological testing, clinical evaluation, and drug nomenclature are being dealt with by other international bodies.

E. CAMPAIGNE, Convenor

## **REPORT ON MACHINE DOCUMENTATION IN THE CHEMICAL FIELD**

*Cortina d'Ampezzo (Italy), 4 July 1969*

At a meeting of the Executive Committee held in Oxford, England, on 14–15 February 1969, it was resolved: "That Dr Kurt L. LOENING, in consultation with Dr J. W. BARRETT, Prof. H. K. LIVINGSTON, and other experts as necessary from throughout the world, be invited to prepare a report on machine documentation in chemistry." Dr LOENING deferred to me. Because of limited time this report was prepared by correspondence and Dr BARRETT and Prof. LIVINGSTON did not have an opportunity to edit the final product.

The Executive Committee requested us to do the following:

- I. Assess the problems of machine documentation
- II. Survey the different approaches already in hand throughout the world (giving the characteristics of each)
- III. Specify the characteristics necessary for chemistry
- IV. Recommend what, if anything, should be done by IUPAC

We had less than two months to work on this report and obviously could not provide adequate answers to any of these important questions. We do, however, have strong recommendations to make that IUPAC should immediately become more involved in the machine handling of chemical information. Action should be taken at this meeting and not delayed for another two years. A brief report follows on the four questions that were raised.

## **I. Assess the problems of machine documentation**

At the national and international level, some studies have identified the following problems of machine systems in handling of scientific and technical information and documentation:

### *A. Systems design characteristics*

- accessibility of information
- availability of documents to back up information systems
- centralization versus decentralization
- operational reliability at systems interfaces
- establishment of guidelines for achieving compatibility between systems by a minimal standard for information transfer

### *B. Systems input*

- problem of identifying boundaries and overlap to avoid unnecessary duplication of processing
- problem of privacy in information systems which may contain both classified and non-classified material
- evaluation of draft standards

### *C. Systems operation*

- time delays in the information storage and retrieval
- operational reliability within a system
- terms of agreement for operational access to systems
- study and evaluation of interconnection among systems
- establishment of a computer software conversion program pool

### *D. Systems output*

- complexity of information retrieval systems, and difficulties of access to the users
- methods of education and training of systems management and systems users
- evaluation of the performance of information systems based on combined or interconnected information stores

### *E. General factors*

- incompatibility of some machine hardware
- software differences, such as systems logic, machine and higher languages, coding, format, sequence
- problems of translation from different national languages
- conceptual or philosophical differences, resulting from different methods of indexing or classification, different kinds and levels of information processed, different kinds of users of the systems
- different national philosophies for providing information services
- administrative and cost relations
- copyright problems
- problems of vested interest

## **II. Survey the different approaches already in hand throughout the world**

This is a gigantic task and we did not have the time, funds and staff to carry out such a study. Machine systems specifications and requirements are rapidly changing as information science advances. Nevertheless there have been many studies and there are many programs underway which have attempted in one way or another and at different levels, to analyze and evaluate the approaches to machine-based information systems. All of these studies contribute to the understanding and advancement of the field of machine processing and cooperation. There are many internationally sponsored activities which we should not duplicate. Some of them are:

- A. UNISIST. A joint study by ICSU/UNESCO on the "Feasibility of a Worldwide Scientific and Technical Information System"
- B. ICSU Abstracting Board
- C. ICSU CODATA
- D. OECD
- E. FID
- F. Others such as ISO, IFLA, etc.

## **III. Specify the characteristics necessary for chemistry**

One major characteristic in chemical information handling not usually found in other scientific disciplines is based upon the need to handle in the machines, a two-dimensional structural diagram, a full stereochemical description, and identification of isotopic labeling of chemical compounds and substances. Because some 85% of the information passing through a chemical information system concerns compounds or materials, there is a constant need for rapid, specific identification of these substances in the document-analysis process. Over the past decade, highly sophisticated systems for handling chemical structure descriptions by computers have been developed, particularly in Germany and the United States.

In fact, two-dimensional structural diagrams break down essentially into mathematical modeling which is also a characteristic of information systems handling piping and wiring diagrams, process flow sheets, and other graphic theory and requirements.

The technical specifications for handling the molecular structural diagrams in a unique and unambiguous form for efficient computer processing are many, long, and complex, requiring specialists trained in chemistry and computers to understand them fully.

Fortunately, technical liaison commissions and committees in information processing have been at work since 1964 in particular to work out the requirements and specifications for handling chemistry. These committees have been working on a bilateral basis among the nations most vitally concerned and on a multilateral basis under auspices of ICSU, UNESCO, ISO, and OECD.

## **IV. Recommendations**

A. IUPAC appoints a Commissions to work on methods for the standardization and codification in the machine handling of chemical information. It should be a Joint

Commission of all the Divisions of IUPAC and have responsible representatives who are directly involved in editorial programs, especially primary and secondary publications.

B. The first task of the Commission should be directed towards the machine handling of chemical structures and the computer generation of nomenclature.

There is a real need for a unique definition of chemical structure which is understandable on the printed page and yet logical, unambiguous to a computer program. Different structures must have a unique positioning in a formal list, universally applicable and can be readily understood by both the processors and users. The original system must be well designed so that it will not be necessary to continuously change and improve.

The above basic principles would require the following for the fulfilment of the objectives:

- (1) Consistency in full range of names
- (2) Greatly reduced numbers of rules and elimination of so many exceptions
- (3) Simplified, consistent numbering of cyclic nuclei
- (4) Computer-checkable intra-name consistency
- (5) Efficient cross checks between names and structural diagrams
- (6) Widely accepted rules for expressing names in reduced character sets
- (7) Standard and universally accepted practices for the selection of index compound

We are indebted to Mr DALE B. BAKER and his staff at Chemical Abstracts for many of the suggestions in this report.

J. W. BARRETT  
H. K. LIVINGSTON  
BYRON RIEGEL, Chairman



## **DETAILED INFORMATION REGARDING FORTHCOMING IUPAC-SPONSORED MEETINGS**

### **Xth EUROPEAN CONGRESS ON MOLECULAR SPECTROSCOPY**

*Liège (Belgium), 29 September–3 October 1969*

The Xth European Congress on Molecular Spectroscopy will take place at the new campus of the University of Liège at Sart-Tilman. Sponsored by IUPAC, the Congress will be strictly limited to the Optical Spectroscopy of the Solid State.

There will be four main sections:

Section I: (a) Infrared spectra  
(b) Raman spectra

Section II: Electronic spectra  
(a) Excitons  
(b) Colour centres  
(c) Molecular crystals

Section III: Charge transfer complexes

Section IV: Matrix spectroscopy

The proceedings of the Congress will be published in "Colloques et Congrès de l'Université de Liège".

Further details may be obtained from: Prof. B. ROSEN, Chairman, Xth European Congress on Molecular Spectroscopy, Institut d'Astrophysique, Cointe-Sclessin (Belgium).

### **7<sup>TH</sup> INTERNATIONAL SYMPOSIUM ON THE CHEMISTRY OF NATURAL PRODUCTS**

*Riga (USSR), 22–27 June 1970*

#### *Date and Location*

The meeting will take place in the buildings of the Latvian Academy of Sciences, Riga (USSR), during the period 22–27 June 1970.

#### *Scientific programme*

The Symposium will be devoted mainly to the chemistry of biologically active biopolymers and bio-regulators. Within the meeting it is proposed to organize separate sections on the following topics:

- A Peptides and proteins
- B Nucleotides and nucleic acids
- C Lipids (including physical chemistry of membranes)

D Carbohydrates

E Other natural products (steroids, terpenoids, alkaloids, antibiotics, etc.)

F Physical methods

### *Symposium lectures*

There will be twelve main Symposium lectures to be given by the following distinguished scientists:

Prof. D. H. R. BARTON (UK), Prof. L. L. M. van DEENEN (Netherlands), Prof. C. DJERASSI (USA), Prof. H. G. KHORANA (USA), Prof. D. E. KOSHLAND (USA), Prof. E. LEDERER (France), Prof. K. NAKANISHI (Japan), Prof. V. PRELOG (Switzerland), Prof. M. M. SHEMYAKIN (USSR), Prof. F. ŠORM (Czechoslovakia), Prof. F. B. STRAUB (Hungary), Prof. R. B. WOODWARD (USA)

### *Contributed papers*

The Scientific Programme Committee will consider papers of special interest and novelty in any branch of Natural Product Chemistry. Members wishing to present a paper at the Symposium will have to submit an abstract and to complete the application forms to be distributed with Circular 2. The abstracts and the applications to contribute a paper for the meeting must reach the Secretary not later than 1 February 1970.

### *Symposium languages*

The official languages of the Symposium will be English and Russian. Contributed papers may be presented in any languages but the organizers suggest that speakers should use a language that is commonly understood by most participants as no arrangements will be made for simultaneous translation. The Symposium literature will be published in English and Russian.

### *Pre-symposia*

Provisional plans have been made to arrange three pre-symposia of restricted scope with a limited number of participants on the following topics:

Mechanism of enzyme catalysis (Chairman: Prof. A. E. BRAUNSTEIN)

Physico-chemical basis of transport through biological membranes (Chairman: Prof. L. D. BERGELSON)

Antibiotics: chemistry and mode of action (Chairman: Prof. A. S. Khokhlov)

The pre-symposia will be held in Riga, 19–20 June, 1970.

### *Correspondence*

Correspondence related to the meetings should be addressed to: Prof. (Mrs) S. N. ANANCHENKO, General Secretary 7th International Symposium on the Chemistry of Natural Products, Institute for Chemistry of Natural Products, USSR Academy of Sciences, Ul. Vavilova 32, Moscow 312 (USSR). Cables: Moscow 312 Bioorganica.

## **INTERNATIONAL SYMPOSIUM ON THE CHEMISTRY OF NONBENZENOID AROMATIC COMPOUNDS**

*Sendai (Japan), 24-28 August 1970*

This symposium is sponsored by the Science Council of Japan and IUPAC. The Organizing Committee wishes to present a programme consisting of novel and important developments in the chemistry of nonbenzenoid aromatic compounds, excluding common heteroaromatics and the following chemists have accepted invitations to give lectures:

Prof. R. BRESLOW (USA), Prof. M.J.S. DEWAR (USA), Prof. W. VAN E. DOERING (USA), Prof. K. HAFNER (W. Germany), Prof. E. HEILBRONNER (Switzerland), Prof. R. HOFFMANN (USA), Prof. A.W. JOHNSON (UK), Prof. T. NAKAJIMA (Japan), Prof. T. NOZOE (Japan), Prof. H. PRINZBACH (Switzerland), Prof. F. SONDHEIMER (UK), Prof. E. VOGEL (W. Germany), Prof. M.E. VOLPIN (USSR), Prof. S. WINSTEIN (USA).

Their papers will be published in "Pure and Applied Chemistry".

For further details apply to: Prof. SHÔ ITÔ, General Secretary of the Symposium, c/o Department of Chemistry, Tohoku University, Sendai, Japan.

## **IIIrd ANALYTICAL CONFERENCE**

*Budapest (Hungary), 24-29 August 1970*

Organized by the Analytical Chemistry Section of the Hungarian Chemical Society under the sponsorship of IUPAC and the Department for Chemical Science of the Hungarian Academy of Sciences, the scientific programme of the conference will consist of invited lectures and contributed papers and include the following topics:

Separation methods in analytical chemistry  
Organic analysis  
Thermal analysis

The following speakers have accepted invitations to deliver a plenary lecture:

Prof. I.P. ALIMARIN (USSR), Dr R. A. CHALMERS (UK), Prof. CL. DUVAL (France), Prof. T. FUJINAGA (Japan), Prof. M. JUREČEK (Czechoslovakia), Prof. W. KEMULA (Poland), Dr J. P. REDFERN (UK), Prof. J. E. SALMON (UK), Prof. W. SIMON (Switzerland), Prof. W. W. WENDLANDT (USA), Prof. P. W. WEST (USA), Prof. T. S. WEST (UK), Prof. J. ZÝKA (Czechoslovakia)

and their papers will be published in "Pure and Applied Chemistry".

An exhibition will take place simultaneously with the conference showing instruments and equipment in the field of chemical analysis.

Correspondence relating to the conference should be addressed to: Hungarian Chemical Society, Szabadság tér 17, Budapest V (Hungary).

## VIIth INTERNATIONAL SYMPOSIUM ON MICROTECHNIQUES

Graz (Austria), 7-11 September 1970

The main purpose of this event, organized by the Austrian Society for Microchemistry and Analytical Chemistry and sponsored by IUPAC, will be to allow microchemists to meet in working sessions to exchange ideas and review developments by means of lectures and exhibitions and to honour eminent scientists. The programme will consist of the following principal themes:

- (a) Organic microanalysis
- (b) Inorganic microanalysis
- (c) Micromethods in biochemistry
- (d) Radiochemical micromethods
- (e) Research and teaching in microchemistry
- (f) Exhibition of microchemical equipment and literature
- (g) Demonstrations and "workshop"

These themes will be dealt with in plenary lectures, by discussion panels and in original papers.

In addition, contributions may be submitted to the panel discussions which will be on

D.I Physico-chemical methods in PREGL-procedures

D.II Microanalysis with electron beams

For further details contact: Prof. G.KAINZ, c/o Intercongress Reisedienst und Betreuungs GmbH, Stadiongasse 6-8, A-1010 Wien (Austria).

### *Organic Chemistry*

Symposia are planned on the following topics:

- (1) Applications of theory and quantum mechanics, L.SALEM (Chairman), Faculty of Science, Orsay (France)
- (2) Spectroscopy in structure determination, K.NAKANISHI (Chairman), Columbia University, New York (USA)
- (3) General methods of synthesis. P.YATES (Chairman), University of Toronto (Canada)
- (4) New natural product syntheses, M. M. SHEMAKIN (Chairman), Institute for the Chemistry of Natural Products, Academy of Sciences, Moscow (USSR)
- (5) Intramolecular rearrangements and valence isomerization, J.BERSON (Chairman), Yale University, New Haven (USA)
- (6) Small rings, E.SCHMITZ (Chairman), Academy of Sciences, Berlin-Adlershof (East Germany)
- (7) Organo-transition metal chemistry, Sir RONALD NYHOLM (Chairman), University College, London (UK)
- (8) Short-lived Intermediates: carbenoids, singlet oxygen, arynes, carbynes, P.SKELL (Chairman), Pennsylvania State University (USA)
- (9) Free radicals and homolytic mechanisms, M.JULIA (Chairman), University of Paris (France)
- (10) Photochemistry, E. HAVINGA (Chairman), Leyden University (Netherlands)
- (11) Medicinal chemistry, B.M.BLOOM (Chairman), Chas. Pfizer & Co., Groton (USA)



## *Macromolecules*

Symposia will be held on timely topics to be selected from principal areas such as the following:

- A Biopolymers and synthetic models for biopolymers, including oligomeric analogs
- B Synthetic polymer chemistry, with emphasis on polymerization mechanisms and on new synthetic methods
- C New applications of polymers
- D Advances in polymer technology
- E Structure, conformation, and stereochemistry of polymer chains
- F Dynamic and thermodynamic properties of polymers and their solutions
- G Chemical reactions of macromolecules, including mechanisms of enzyme action

## *Joint Symposia*

In addition to the foregoing, joint symposia are planned on the following topics:

- (1) Homogeneous catalysis, G. WILKE (Chairman), Max-Planck-Institut für Kohlenforschung, Mühlheim-Ruhr (Germany)
- (2) Biocatalysis, D. E. KOSHLAND (Chairman), University of California at Berkeley (USA)
- (3) Synthesis of biopolymers and biooligomers
- (4) Advances in conformational analysis
- (5) Ion-pair processes, M. SZWARC (Chairman), State University College of Forestry at Syracuse (USA)

## **Correspondence**

All correspondence concerning the Congress should be addressed to:

Secretariat: XXIII Congress of Pure and Applied Chemistry, A. T. WINSTEAD, Director, c/o American Chemical Society, 1155 Sixteenth Street, N.W. Washington, DC 20036 (USA)

Cable Address: AmChemSo  
Washington, DC

## **XXIII<sup>RD</sup> INTERNATIONAL CONGRESS OF PURE AND APPLIED CHEMISTRY**

*Boston, Massachusetts (USA,) 25–31 July, 1971*

The National Academy of Sciences—National Research Council of the United States of America— extends a cordial invitation to participate in the XXIII<sup>rd</sup> International Congress of Pure and Applied Chemistry, under the sponsorship of the International Union of Pure and Applied Chemistry, to be held in Boston (Massachusetts), 25–31 July, 1971.

### *Organizing Committee*

*Chairman:* CRAWFORD H. GREENEWALT, E.I. du Pont de Nemours & Co., Inc.,  
Wilmington, Delaware

*Vice-Chairman:* RALPH CONNOR, Rohm & Haas Co., Philadelphia, Pennsylvania

*Executive Secretary:* MARTIN A. PAUL, National Academy of Sciences—National  
Research Council, Washington, DC

*Program:* Paul D. BARTLETT, Harvard University, Cambridge, Massachusetts

*Organic:* BLAINE C. MCKUSICK, E.I. du Pont de Nemours & Company, Inc.,  
Wilmington, Delaware

*Macromolecules:* PAUL J. FLORY, Stanford University, Stanford, California

*Finance:* KENNETH H. HANNAN, Union Carbide Corporation, New York City,  
New York

*Hospitality:* LOUIS W. CABOT, Cabot Corporation, Boston, Massachusetts

*Local Arrangements and Secretariat Director:* A.T. WINSTEAD, American Chemical  
Society, Washington, DC

*Public Information:* B.R. STANERSON, American Chemical Society, Washington, DC

*Travel Awards:* CHARLES G. OVERBERGER, The University of Michigan, Ann Arbor,  
Michigan

### **Scientific program**

A distinguished scientific program will encompass the interests of two Divisions of the International Union of Pure and Applied Chemistry: *Organic Chemistry* and *Macromolecules*.

## REPORTS ON IUPAC ACTIVITIES

### 2<sup>ND</sup> INTERNATIONAL SYMPOSIUM ON CAROTENOIDS OTHER THAN VITAMIN A

*Las Cruces, New Mexico, 6-9 May 1969*

The Second International Symposium on Carotenoids other than Vitamin A was held at New Mexico State University, Las Cruces, New Mexico (USA), with sponsorship by IUPAC (Organic Chemistry Division). Financial support was received from Hoffmann-La Roche, Nutley, New Jersey; National Science Foundation; and New Mexico State University. The program was arranged by Prof. B. C. L. WEEDON, Dr S. L. JENSEN, Prof. T. W. GOODWIN and Prof. O. B. WEEKS and details of the meeting by Dr J. D. SURMATHIS, Prof. C. O. CHICHESTER and Prof. O. B. WEEKS (Chairman).

The scientific program included plenary lectures, session lectures and contributed research papers on three general topics: "Physical-organic techniques in structural studies of carotenoids"; "Structure and synthesis of natural carotenoids"; and "Biosynthesis and function of carotenoids". The plenary and session lectures were:

Dr U. SCHWIETER (Hoffmann-La Roche, Basle, Switzerland): "Physical-organic methods in carotenoid research" (plenary lecture)

Dr M. B. HURSTHOUSE (Queen Mary College, London): "X-ray crystallographic studies" (session lecture)

Prof. B. C. L. WEEDON (Queen Mary College, London): "Optical rotatory dispersion studies on carotenoids" (session lecture)

Dr CURT ENZELL (Swedish Tobacco Co., Stockholm): "Mass spectrometric studies of carotenoids" (session lecture)

Dr SYNNOVE L. JENSEN (Norwegian Technical University, Trondheim): "Selected examples of structure determination of natural carotenoids" (plenary lecture)

Prof. C. BODEA (Institutul de Chimie, Cluj, Romania): "Cyclization reactions of carotenoids in vivo and in vitro" (session lecture)

Prof. B. C. L. WEEDON (Queen Mary College, London): "Some recent advances in synthesis of carotenoids" (session lecture)

Mr A. G. ANDREWES (New Mexico State University, Las Cruces): "Carotenoids of *Flavobacterium dehydrogenans*" (session lecture)

Dr B. H. DAVIES (University College of Wales, Aberystwyth): "Structure studies of bacterial carotenoids and their biosynthetic implications" (session lecture)

Dr J. W. PORTER (University of Wisconsin, Madison): "Studies on enzymic synthesis of carotenoids and related compounds" (plenary lecture)

Prof. T. W. GOODWIN (University of Liverpool, England): "Stereospecific biosynthesis of carotenoids particularly xanthophylls" (plenary lecture)

Dr CHRISTOPHER FOOTE (University of California, Los Angeles): "Carotenoids in photooxidation" (session lecture)

Dr H. YAMAMOTO (University of Hawaii, Honolulu): "Recent studies on carotenoid function in photosynthesis" (session lecture)

In addition the program included 16 contributed research papers. Approximately 75 persons from Great Britain, Europe and the United States attended the Symposium.

The plenary lectures and selected session lectures will be published by IUPAC in "Pure and Applied Chemistry" and may be obtained as a separate publication from Butterworths, London. Session lectures not published and abstracts of contributed papers will be collated and sent to symposium participants by the program chairman.

An informal meeting was held after the banquet and it was decided to continue the international meetings possibly on a triannual basis with the next meeting to be held in Europe during 1972. A semiannual newsletter will be commenced with Dr S. L. JENSEN, Norwegian Technical University, Trondheim, and Prof. O. B. WEEKS, New Mexico State University, Las Cruces, initiating the venture.

## **COLLOQUE WEYL II: NATURE OF METAL-AMMONIA SOLUTIONS**

*Ithaca, N. Y. (USA), 16-20 June 1969*

Six years after the eminently successful first Colloque Weyl, held in Lille (France) in June 1963, a second international symposium on the "Nature of Metal-Ammonia Solutions" was held at Cornell University, Ithaca, N.Y. About 60 international experts—chemists, physicists, and engineers involved in metal-ammonia research—participated in the lectures, papers, and vigorous discussions that marked the meeting. There were seven plenary lectures given by J. L. DYE (Models of  $M-NH_3$  solutions), R. CATTERALL (Magnetic properties), W. L. JOLLY (Chemical properties), U. SCHINDEWOLF (Pressure effects), G. LEPOUTRE (Concentrated solutions), M. J. SIENKO (Phase separation), and N. MAMMANO (Solid compounds). In addition there were 25 contributed papers and 6 brief communications. The emphasis of the meeting was on discussion; the purpose was to promote interchange between theorists and experimentalists in domains of both chemistry and physics. The proceedings were recorded and are to be published as a supplement to the IUPAC journal "Pure and Applied Chemistry".

M. J. SIENKO

## **IUPAC SYMPOSIUM ON CHEMICAL CONTROL OF THE HUMAN ENVIRONMENT**

*Johannesburg, South Africa, 14-18 July 1969*

This Symposium was organized by the South African Chemical Institute and the South African Council for Scientific and Industrial Research (CSIR). It was divided into five sections, dealing respectively with (i) Air Pollution, (ii) Water Treatment, (iii) Agricultural Pests, (iv) Animal and Human Health, (v) Toxic Substances of Natural Origin. The first three were treated broadly, particular interest being taken in the third section on the problems raised by pesticide residues. The fourth was limited to control of vectors for malaria and bilharzia and to problems of additives in stock-feeds and in human food. The fifth received a very full treatment from the chemical viewpoint, mainly because of interest in South African work on mycotoxins. This



section and certain of the papers of chemical interest in section (iii) will be published in a special number of the "Journal of the South African Chemical Institute".

There were eight plenary lectures given by Prof. A.S.CRAFTS (USA), Prof. L.A. GOLDBLATT (USA), Prof. L.GOLBERG (USA), Prof. F.A.GUNTHER (USA), Prof. H. HUBER (USA), Prof. K.J.IVES (UK), Prof. W.TESKE (Germany) and Prof. R.TRUHAUT (France). These will be published by Butterworths. In addition, there were about eighty other lectures, about half of which were presented by distinguished speakers from overseas. These were of half-hour duration and run in three concurrent sessions.

The Symposium was opened by Dr S.M.NAUDÉ, the President of the CSIR, and took place in the Chemistry Department of the University of the Witwatersrand. Just over 330 delegates registered for a very stimulating and successful Symposium. Arrangements were made for an excursion, a banquet, several social gatherings each evening and a comprehensive Ladies Programme, all of which proved very popular.

The Symposium was attended by Dr BENGT LUNDHOLM, Chairman of an *ad-hoc* Committee on the Human Environment appointed by ICSU, together with three of his committee members, and a meeting was arranged by them with all interested parties on 19 July, immediately after the Symposium.

Dr P.C. CARMAN

## DETAILED INFORMATION REGARDING FORTHCOMING EVENTS

### SYMPOSIUM ON MAN-MADE LAKES

#### Their Problems and Environmental Effects

*Knoxville (Tennessee, USA), 3-7 May 1971*

#### *First announcement*

An International Symposium on Man-Made Lakes—Their Problems and Environmental Effects will be held at Knoxville, Tennessee, on 3-7 May 1971. The conference should be of interest to a broad range of scientists, engineers, and project managers.

The conference is being organized by the Scientific Committee on Water Research (COWAR) on behalf of the International Council of Scientific Unions (ICSU). Numerous Unions and Committees of ICSU are cooperating, and agencies of the United Nations are providing support. Arrangements in the United States are by the National Academy of Sciences and the Tennessee Valley Authority (TVA).

The Symposium will assess recent findings, summarize knowledge, and point to needed research on man-made lakes. Principal topics will be water temperature and chemical quality; aquatic ecosystems including eutrophication, aquatic weeds, and fishery biology; siltation including amounts, control, and removal; effects upon adjoining terrestrial ecosystems; seepage; microclimate and evaporation; fishery development; resettlement and marginal agriculture; public health effects including water vectors, insects, and water quality; seismic problems; and recreation and transportation effects.

The Symposium will be organized around (1) broad, interdisciplinary case studies of the world's great man-made lakes and collections of lakes, (2) regional summaries and discussion of the several conference topics, and (3) visits to TVA projects and other facilities of interest. All sessions will be plenary. Individual papers are invited, and those which are accepted will be summarized and discussed at the Symposium and reproduced in full in the Proceedings. Abstracts are solicited before 1 May 1970.

Address all inquiries regarding attendance and participation to: Prof. WILLIAM C. ACKERMANN, President, Scientific Committee on Water Research, Illinois State Water Survey, Box 232, Urbana, Illinois 61801 (USA).

Our colleague OURISSON of Strasbourg was given the "Otto-Wallach-Plakette" for his outstanding work on the chemistry of terpenes and natural products. His expression of thanks before the General Assembly in Hamburg is a masterpiece which is worthwhile for all chemists to read.

#### **Verleihung der «Otto-Wallach-Plakette»**

*Hamburg, 17. September 1969*

Meine Damen und Herren!

«Les décorations sont les hochets du vieillard», sagt man auf französisch. Das heisst: «Ehrungen sind Kinderklappen für Greise.»

Es ist also ganz merkwürdig, dass manche nicht besonders eitle Leute solche Alterszeichen ganz gutwillig akzeptieren – sogar, wie ich sicher heute, mit einem naiven Stolz.

Das ist einfach nicht logisch, und ich ziehe eine prälogische, eine magische Erklärung vor.

Es ist sicher eine primitive Art eines Ahnenkults.

Die wissenschaftlichen Gesellschaften haben ihre Preise durch Heldennamen charakterisiert, die sicher als Schutz gegen böse Geister dienen sollen, d.h. gegen böse Studenten oder böse Kollegen. Heute zum Beispiel haben Sie, Herr Präsident, meinen Mitarbeitern und mir selbst einen fast mythischen Urahn, sogar ein Totem gegeben.

Wissenschaftliche Preise besitzen noch weitere magische Eigenschaften, indem man sich nicht nur der Gunst des mythischen Namengebers versichert, sondern auch sich mit den früheren Preisträgern symbolisch identifiziert und sich dadurch ihre Kräfte sichert.

Es hat mich also besonders erfreut zu hören, dass der frühere Preisträger der Otto-Wallach-Plakette mein hochgeehrter Kollege Professor WALTER HÜCKEL ist, mit dem ich manche Interessen teile. Nicht nur die Stereochemie, sondern auch die langen Wanderungen in den Vogesen!

Auf dem Programm waren 3 bis 5 Minuten für mein Dankwort reserviert, und ich habe mich noch nicht einmal bedankt.

Herr Präsident Brederick, wenn ein Preis Ihrer Gesellschaft einem Chemiker gegeben wird, der aus einer anderen Provinz Europas kommt, bedeutet es sicher für ihn dasselbe, als ob ein deutsches Restaurant vom Guide Michelin mit einem zusätzlichen Stern ausgezeichnet würde. Nicht nur ein Stern, sondern ein Michelin-Stern.

Nicht nur eine Plakette, sondern wohl eine Plakette der Gesellschaft deutscher Chemiker!

Ich bedanke mich sehr herzlich für die Ehre, die Sie durch die Otto-Wallach-Plakette mir und meinen Mitarbeitern bereitet haben.



## IUPAC-SPONSORED MEETINGS

1970

April 1-4	International Conference on Thermodynamics (Dr W.J. HORNIX, Secretary of Organizing Committee, Department of Applied Mathematics and Mathematical Physics, University College of South Wales, Cardiff CF1 3NR, UK)	Cardiff (UK)
June 22-27	VIIth International Symposium on the Chemistry of Natural Products (Prof. S.N. ANANCHENKO, General Secretary, VIIth International Symposium on the Chemistry of Natural Products, Institute for Chemistry of Natural Products, Academy of Sciences of USSR, ul. Vavilova 18, Moscow 312, USSR)	Riga (USSR)
July 6-11	Symposium on Non-aqueous Electrochemistry: Organic and Inorganic Solvents including Fused Salts (Mme J. BADOZ-LAMBLING, Laboratoire de Chimie analytique, Ecole supérieure de Physique et de Chimie industrielles, 10, rue Vauquelin, F-75 Paris 5 <sup>e</sup> , France)	Paris (France)
July 12-18	IIIrd International Symposium on Photochemistry (Prof. D. BRYCE-SMITH, Department of Chemistry, University of Reading, Whiteknights Park, Reading, Berkshire, UK)	St. Moritz (Switzerland)
August 17-22	Vth International Symposium on Carbohydrate Chemistry (Dr L. MESTER, Secretary General, Vth International Symposium on Carbohydrate Chemistry, Institut de Chimie des Substances naturelles, F-91 Gif-sur-Yvette, France)	Paris (France)
August 25-30	International Symposium on the Chemistry of Nonbenzenoid Aromatic Compounds (Prof. S. IRÔ, General Secretary, International Symposium on the Chemistry of Nonbenzenoid Aromatic Compounds, Department of Chemistry, Tohoku University, Sendai, Japan)	Sendai (Japan)
August 31- September 4	Symposium on Macromolecules: Physical Chemistry and Physics of Synthetic Polymers, Natural Polymers and Biopolymers (Prof. A.J. STAVERMAN, Chemische Laboratoria de Rijks-Universiteit, PO Box 75, Leiden, Netherlands)	Leiden (Netherlands)
September 7-11	VIth International Symposium on Microtechniques (Sekretariat des VI. Internationalen Symposiums für Mikrochemie, c/o INTERCONGRESS, Stadiongasse 6-8, A-1010 Wien, Austria)	Graz (Austria)
September 7-11	IInd Symposium on Organic Solid-State Chemistry (Prof. M.D. COHEN, Department of Chemistry, Weizmann Institute of Science, Rehovoth, Israel)	Rehovoth (Israel)
September 7-12	Symposium on Models of Biopolymer Structure and Functions (Prof. O. WICHTERLE, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Prague 6 - Petřiny, Czechoslovakia)	Carlsbad (Czechoslovakia)
September 11-18	XIIIth International Conference on Co-ordination Chemistry (Dr K. BUKIETŃSKA, Secretary, XIIIth International Conference on Co-ordination Chemistry, Uniwersytet Wrocławski, Katedra Chemii Nieorganicznej, Wrocław, Poland)	Zakopane/ Cracow (Poland)
September 14-17	Symposium on Cycloaddition (Prof. R. HUISGEN, Institut für Organische Chemie der Universität München, Karlstrasse 23, D-8000 München 2, Germany)	Munich (Germany)
September 24-29	IIIrd Analytical Conference (IIIrd Analytical Conference, Hungarian Chemical Society, Budapest V, Szabadság tér 17, Hungary)	Budapest (Hungary)
September 8-11	Symposium on Chemistry of Pesticides under Metabolic and Environmental Conditions (Prof. F. KORTE, Institut für ökologische Chemie der Gesellschaft für Strahlenforschung mbH, München, 5201 Schloss Birlinghoven, Germany)	Bonn (Germany)

November 2-6	Congress on Industrial Waste Water (Mr B. GÖRANSSON, Swedish Water and Air Pollution Research Laboratory, Drottning Kristinas väg 47D, S-11428 Stockholm, Sweden)	Stockholm (Sweden)
1971		
February	Symposium on Chemistry of Terminal Pesticide Residues (Dr C. RESNICK, Ministry of Agriculture, PO Box 15030, Jaffa, Israel)	Tel Aviv (Israel)
February-March	IIInd International Congress of Pesticide Chemistry (Dr C. RESNICK, Ministry of Agriculture, PO Box 15030, Jaffa, Israel)	Tel Aviv (Israel)
July 15-24	XXVIth International Conference of Pure and Applied Chemistry (Executive Secretary, IUPAC Secretariat, Bank Court Chambers, 2/3 Pound Way, Cowley Centre, Oxford OX4 3YF, UK)	Washington, DC (USA)
July 26-31	XXIIIrd International Congress of Pure and Applied Chemistry (Mr. A. T. WINSTEAD, American Chemical Society, 1155 Sixteenth Street NW, Washington, DC 20036, USA)	Boston (USA)
Summer	IIIrd International Conference on Crystal Growth (Dr B. MUTAF-TSHIEV, Laboratoire de Minéralogie-Cristallographie, Université d'Aix-Marseille, Marseille, France)	Marseille (France)
1972		
April 3-7	International Congress on Analytical Chemistry (Prof. T. FUJINAGA, Faculty of Sciences, University of Kyoto, Kyoto, Japan)	Kyoto (Japan)
August	Vth International Congress on Catalysis (Prof. R. L. BURWELL, Jr, Department of Chemistry, Northwestern University, Evanston, Illinois 60201, USA)	(USA)

## CALENDAR OF NON-IUPAC MEETINGS

1970

June 17-19	International Symposium on Gustation and Olfaction. President: Prof. O. REVERDIN, Geneva (Secretary: POB 124, CH-1211 Geneva 8, Switzerland)	Geneva (Switzerland)
September 7-12	Meeting on Activation Analysis in Geochemistry and Cosmochemistry (Secretary: E. ANDERSEN, Reactor School, Institutt for Atomenergi, N-2007 Kjeller, Norway)	Kjeller/Oslo (Norway)

## LIST OF ABBREVIATIONS

CBN	Commission on Biochemical Nomenclature
CIG	Comité International de Géophysique
CIOMS	Council for International Organizations of Medical Sciences
COSPAR	Committee on Space Research
ECOSOC	Economic and Social Council of United Nations
FAGS	Federation of Astronomical and Geophysical Services
FAO	Food and Agriculture Organization
IAEA	International Atomic Energy Agency
IAMS	International Association of Microbiological Societies
IASH	International Association of Scientific Hydrology
IAU	International Astronomical Union
IBP	International Biological Programme
IBRO	International Brain Research Organization
ICRO	International Cell Research Organization
ICSU	International Council of Scientific Unions
IGU	International Geographical Union
IGY	International Geophysical Year
IMU	International Mathematical Union
IQSY	International Years of the Quiet Sun
ISO	International Organization for Standardization
ITU	International Telecommunication Union
IUB	International Union of Biochemistry
IUBS	International Union of Biological Sciences
IUCr	International Union of Crystallography
IUCN	International Union for the Conservation of Nature and Natural Resources
IUCRM	Inter-Union Commission on Radio Meteorology
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
IUNS	International Union of Nutritional Sciences
IUPAC	International Union of Pure and Applied Chemistry
IUPAP	International Union of Pure and Applied Physics
IUPS	International Union of Physiological Sciences
IUTAM	International Union of Theoretical and Applied Mechanics
JCAM	Joint Commission on Atomic Masses
JCAR	Joint Commission on Applied Radioactivity
SCAR	Scientific Committee on Antarctic Research
SCOR	Scientific Committee on Oceanic Research
UMC	Upper Mantle Committee
UNESCO	United Nations Educational, Scientific and Cultural Organization
URSI	Union Radio Scientifique Internationale
WDC	World Data Centre
WHO	World Health Organization
WMO	World Meteorological Organization

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**INTERNATIONAL UNION OF PURE  
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**UNION INTERNATIONALE DE CHIMIE  
PURE ET APPLIQUÉE**

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NUMBER 37**

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Cables-IUPACAIRPORT

## **IUPAC INFORMATION BULLETIN**

The Bulletin, issued three times per annum, provides a news medium for the various activities of IUPAC, especially of topics which need regulation, standardization or codification. It includes details of forthcoming international symposia which are to be sponsored by IUPAC together with reports of some such meetings which have recently taken place.

Commencing Bulletin No. 37 (Spring 1970), gratis copies will no longer be distributed so widely as in the past. The Bulletin is available at an annual subscription of \$2.5 (£1) from the IUPAC Secretariat.

## **New Section on Medicinal Chemistry incorporated in the IUPAC Division on Organic Chemistry**

In Zürich from 13–15 February was held the inaugural meeting for the creation of the new “Section on Medicinal Chemistry”.

### **Participants**

Section Chairman: Prof. E. CAMPAIGNE; Section Secretary: Dr A. I. RACHLIN; Secretary General, IUPAC: Dr R. MORF; Titular Members: Prof. E. J. ARIENS, Dr. F. L. ROSE, Prof. P. SENSI; Associate Members: Prof. J. A. GAUTIER, Prof. M. PROTIVA, Dr L. H. STERNBACH; Guests (present part-time): Dr H. FRIEBEL (Geneva, representing WHO), Prof. R. HUNSPERGER (Zürich, representing IUPS), Prof. C. MARTIUS (Zürich, representing IUB), Dr J. RUTSCHMANN (Sandoz AG, representing the Basle chemical industries), Dr C. COMBET-FARNOUX (Paris, assisting Prof. GAUTIER), Dr J. THUILLIER (Paris, representing Société de Chimie thérapeutique and European Federation of Medicinal Chemists).

A detailed report will be printed in the next “Information Bulletin”.

## **APPLIED CHEMISTRY DIVISION FERMENTATION INDUSTRIES SECTION**

### **THE EVALUATION OF ACTIVE DRY BAKER'S YEAST— A PROGRESS REPORT**

**1965–1968**

Prof. H. SUOMALAINEN, Chairman (Finland); Dr A. F. LANGLYKKE, Vice-Chairman (USA); Dr F. PARISI, Secretary (Italy); Prof. K. ARIMA (Japan); Prof. A. FIECHTER (from 1967) (Switzerland); Dr J. C. HOOGERHEIDE (from 1967) (The Netherlands); Prof. S. J. PIRT (from 1967) (UK); Dr W. CUTHBERTSON (till 1967) (UK); Prof. H. LUNDIN (Sweden); Mr H. J. BUNKER (UK); Prof. B. DREWS (Germany)†; Dr H. J. PEPPLER (USA); Acad. I. MALEK (Czechoslovakia); Mr R. F. LIGHT (USA); Dr P. BIROLAUD (till 1967) (France); Prof. L. GENEVOIS (till 1967) (France); Prof. J. F. GUYMON (till 1967) (USA)

At a meeting of the Section in Paris, 2 and 3 July 1965, a decision was taken to undertake the study of methods for the evaluation of active dry baker's yeast.

Preliminary consideration and planning of the studies were considered in the meetings of 12 and 13 September 1966 in Paris after developing the program by correspondence.



Certain guidelines were established in the 1966 meeting of the Section as follows:

(1) Certain analytical determinations of elements such as nitrogen, phosphorus, etc., are not of direct utility in determining the value of active dry yeast. However, the determination of moisture is a useful parameter and should be carried out by a method such as that of A. L. BRANDON [1] employing the procedure for the determination of moisture in dry yeast (method 2, air oven method, p. 396). This method is the same as that which has been adopted for inactive dry yeast [2].

(2) Bacterial and mould counts are informative (the procedures of the US Pharmacopeia XV [3] should be followed as proposed for inactive dry yeast [2]).

(3) The value of other microbiological determinations should be investigated (for example, rope spore count and determination of incidence of Salmonella or Staphylococcus).

(4) Of greater significance than other secondary analytical tests are the criteria of performance. Thus, keeping quality and fermentation power are, of course, critically important in the evaluation of active dry baker's yeast, and the attention of the Section should be especially directed towards these criteria of value.

Though the report by SCHULZ [4] was persuasive, it was observed that manometric methods based on the use of simple sugars gave extremely variable results which were not consistent with the behavior of the yeasts under test in baking test procedures. It was, therefore, decided that in order to settle on methods which would yield data reproducible among many laboratories around the world and which would give comparable data, investigations should be undertaken to determine whether fermentation power in flour-containing media was greatly influenced by differences in flour sources, as is commonly supposed.

Therefore, in 1966–1967 several laboratories in widely distributed parts of the world were enlisted. Each laboratory provided to each of the others a quantity of its standard flour. In turn, each laboratory employed its usual evaluation procedure with each of the flours supplied. The tests were divided into two broadly general types, that is, “dough tests” and “manometric tests”. A single standard dry yeast supplied by Standard Brands, Inc., was used for all of the test procedures.

In the first stage it was not deemed feasible nor advisable to standardize the test procedures for the following reasons:

(1) Delay and difficulty would result on requesting many different laboratories to adopt methods with which they were not familiar or to acquire apparatus for a few tests only.

(2) There were no *a priori* reasons to distinguish between methods for validity or quality.

(3) It was of interest to determine if the influence of flour variety was similar in a variety of different methods.

Laboratories of the following companies and institutions participated in the preliminary inquiry:

- I. Anheuser-Busch, Inc. (USA)
- II. Bundesforschungsanstalt für Getreideverarbeitung (Germany)
- III. Aktieselskabet Dansk Gaerings Industri (Denmark)
- IV. The Distillers Company Limited, Yeast and Food Div. (England)
- V. Distillerie Italiane SpA (Italy)
- VI. Flour Milling and Baking Research Assoc. (England)

- VII. Ets Fould-Springer (France)
- VIII. Karl Berthold Benecke, Institut für Hefeforschung (Germany)
- IX. D. W. Kent-Jones & A. J. Amos (England)
- X. Koninklijke Nederlandsche Gist- en Spiritusfabriek NV (Holland)
- XI. Mauri Brothers & Thomson Ltd. (Australia)
- XII. Oriental Yeast Co. Ltd. (Japan)
- XIII. Patentauswertung Vogelbusch-Gesellschaft mbH (Austria)
- XIV. (cancelled)
- XV. (cancelled)
- XVI. Standard Brands, Inc. (USA)
- XVII. Svenska Jästfabrikaktiebolaget (Sweden)
- XVIII. The Finnish State Alcohol Monopoly (Finland)
- XIX. Universal Foods Corp. (USA)
- XX. Doty Laboratories Inc. (USA)
- XXI. Institut für Gärungsgewerbe und Stärkefabrikation (Germany)
- XXII. Dept. of Agricultural Chemistry, The University of Tokyo (Japan)
- XXIII. Food Research Institute, Ministry of Agriculture and Forestry (Japan)♦

The statistical interpretation of the results obtained during the preliminary inquiry is reported in Table 1 for "dough tests" and in Table 2 for "manometric tests".

Differences in performances with different flours were substantial in every laboratory. However, with certain procedures and particularly for those employing the SJA fermentograph, the variability among flours could be considered acceptable for tests of this type, which, of course, are mainly concerned with practical application.

It is significant to observe that, generally speaking, the "dough tests" were considerably less variable than the "manometric tests". Finally, the F test (F Snedecor's ratio) demonstrated that, in performance tests, the differences between flours and between laboratories were significant. This test, however, showed that a number of laboratories were in fair agreement in evaluation of the test yeast. Therefore, on review of the date in the meeting of the Section, 30 and 31 August 1967 in Prague, a second series of collaborative studies was proposed.

In the second collaborative study, procedures were limited to two methods (the method employing the SJA fermentograph and the method of BURROWS and HARRISON [5] fermentometer, the two most commonly employed methods in the first series and which gave the most uniform results in "dough tests" and in "manometric tests") and to the use of four different standard dry yeasts supplied for the purpose by:

- (1) Koninklijke Nederlandsche Gist- en Spiritusfabriek NV
- (2) The Distillers Company Limited
- (3) Standard Brands, Inc.
- (4) Universal Foods Corp.

The samples of yeast were sent to the Section Secretary who, in turn, re-packed the samples and encoded them. The samples were then sent to all participants in the

♦ Data not received in time for statistical interpretation.

second series. Due particularly to the limitation on procedures, there were fewer participants in the second series than in the first. Participating laboratories included:

- IV. The Distillers Company Limited (England)
- V. Eridania Zuccherifici Nazionali (Italy)
- VI. Flour Milling and Baking Research Assoc. (England)
- VII. Ets Fould-Springer (France)
- VIII. Karl Berthold Benecke, Institut für Hefeforschung (Germany)
- X. Koninklijke Nederlandsche Gist- en Spiritusfabriek NV (Holland)
- XI. Mauri Brothers & Thomson Ltd. (Australia)
- XII. Oriental Yeast Co. Ltd. (Japan)
- XVI. The Fleischmann Laboratories—Standard Brands Inc. (USA)
- XVII. Svenska Jästfabriksaktiebolaget (Sweden)
- XVIII. The Finnish State Alcohol Monopoly (Finland)
- XXI. Institut für Gärungsgewerbe und Stärkefabrikation (Germany)
- XXII. Dept. of Agricultural Chemistry, The University of Tokyo (Japan)
- XXIII. Food Research Institute, Ministry of Agriculture and Forestry (Japan)

Exact descriptions of the two methods to be followed were distributed to all laboratories. As might have been expected, each laboratory suggested some variation in methodology, but there was little agreement among laboratories. Therefore, instructions were issued to employ the two methods exactly as described by SJA and by BURROWS and HARRISON.

Tables 3, 4, 5 and 6 present statistical evaluation which leads to the following conclusions:

#### A. BURROWS and HARRISON method (Table 3)

1. Variability among laboratories ( $F_{5\%}$ ) is significant.
2. The results with various flours show that values for red, green and black yeasts exceed the critical range while they never exceed it for grey yeast.

#### B. SJA method

1. Results presented in Table 4 demonstrate that for volume increase after one hour and time required to produce 450 ml and for any sample of yeast, there are no significant differences among the flours employed. However, among laboratories there are significant differences. However, since the SJA method yields an evaluation of yeast independent of flour differences, it would appear to be an acceptable standard method for comparison, provided it is used only for comparison in the early stages of activity; that is, at one hour of gas production or at the time required to reach 450 ml.

The data presented in Table 5 clearly show that differences among yeasts are measurable and significant.

The results presented in Table 6 for the SJA method demonstrate that there is considerable variation among laboratories.

In summary, the investigations so far conducted establish that under carefully defined and controlled conditions, different flour types and flour sources have little



effect in one test procedure for yeast evaluation. Under some circumstance the use of different flour samples may lead to highly variable results, but it is possible that if the medium is well controlled and well supplemented in addition to the flour, the flour itself will have little or minimal influence.

For the present it is impossible to specify methods that may be used in different laboratories for the purpose of establishing merit or value of a single yeast. The first series of studies conducted collaboratively were quite inconclusive, and the second series demonstrated considerable variability between a number of laboratories which are extremely competent in the field.

This progress report is not offered to recommend a standard procedure, but as a guide to the selection of such a method. Standard procedures for the evaluation of active dry yeasts are desirable, particularly since active dry yeasts are becoming more and more important as articles of commerce. The Section will continue to study procedures for yeast evaluation as they may be applied to active dry yeast. The results of such studies are of importance to manufacturers, consumers and public authorities alike.

### *Literature*

- 1 A. L. BRANDON: J. Ass. Off. Agr. Chemists *44*, 394 (1961)
- 2 Pure and Applied Chemistry, *7*, 147 (1963)
- 3 U. S. Pharmacopeia *XV*, 790 (1965)
- 4 A. SCHULZ: Brot und Gebäck *19*, (4) 61 (1965)
- 5 S. BURROWS/J. S. HARRISON: J. Inst. Brewing *65*, 39 (1959)



Table 1 Statistical calculation of the data obtained through methods based on a dough preparation

Laboratory	Test-method	Readings	Number of samples tested $n$	Mean of the series $\bar{x}$	Standard deviation $s$	Standard deviation as % of the mean $\frac{s}{\bar{x}} \cdot 100$	Confidence intervals for the single value $\bar{x} \pm t_{0.05} \cdot s$	Limits of the mean $t_{0.05} \cdot s$ $\frac{t_{0.05} \cdot s}{\sqrt{n}}$
I	Fermentation time to a standard volume	in min	18	110.17	7.21	6.54	94.96–125.38	$\pm 3.59$
II	Hofmann method	volume after 60 min	18	456.67	57.88	12.67	334.54–578.80	$\pm 28.80$
III	Fermentation time to a standard volume	volume after 180 min with 2 g of yeast	18	1678.33	165.47	9.86	1329.19–2027.47	$\pm 82.34$
V	D.I. method—Increase in volume in a standard time	with 5 g of yeast	18	93.78	9.19	9.80	74.39–113.17	$\pm 4.57$
VI	Total volume reached in 3 hours		18	42.94	6.75	15.72	28.70–57.18	$\pm 3.36$
VII	SJA Fermentograph		18	297.17	12.97	4.36	269.80–324.54	$\pm 6.45$
VIII	Fermentation time to a standard volume	time for 450 ml	18	134.72	16.66	12.37	99.57–169.87	$\pm 8.29$
IX	SJA Fermentograph		18	72.72	6.85	9.42	58.27–87.17	$\pm 3.41$
X	Brabender Fermentograph	time for 450 ml	18	166.83	10.70	6.41	144.25–189.41	$\pm 5.30$
XI	Increase in volume in a standard time	volume after 120 min	18	76.33	6.79	8.90	62.00–90.66	$\pm 3.38$
XII	SJA Fermentograph	volume after 150 min	18	283.33	25.38	8.96	229.78–336.88	$\pm 12.63$
XIII	“Verbandmethode”	after 240 min	18	613.05	53.06	8.65	501.09–725.01	$\pm 26.40$
XIV	SJA Fermentograph (modified)	after 150 min	18	111.53	15.49	8.73	78.85–144.21	$\pm 7.71$
XV	SJA Fermentograph	time in min	18	166.80	9.74	5.84	146.25–187.35	$\pm 4.85$
XVI	SJA baking test	volume after 180 min	18	406.67	52.08	12.81	296.78–516.56	$\pm 25.92$
XVII	Fermentation time to a standard volume	volume after 150 min	18	100.44	10.19	10.15	78.94–121.94	$\pm 5.07$
XVIII	SJA Fermentograph	min	17	1152.53	87.00	7.55	968.09–1336.97	$\pm 44.77$
XIX	Dough test	ml after 3 h	18	437.78	56.55	12.92	318.46–557.10	$\pm 28.14$
XX	“Verbandmethode”	% of time referred to a standard yeast	18	158.00	8.26	5.23	140.57–175.43	$\pm 4.11$
XXI		time in min	18	87.72	3.07	3.50	81.24–94.20	$\pm 1.53$
XXII	SJA Fermentograph	time for 450 ml	18	61.22	3.89	6.35	53.01–69.43	$\pm 1.94$
XXIII	“Verbandmethode, Reiter”	ml after 3 h	18	1938.17	144.16	7.44	1633.99–2242.35	$\pm 71.74$
XXIV	SJA Fermentograph	in min	18	95.83	11.65	12.16	71.25–120.41	$\pm 5.80$
XXV	SJA Fermentograph	time for 450 ml	18	64.89	1.87	2.88	60.94–68.84	$\pm 0.93$
XXVI	Dough test	ml after 3 h	18	1915.28	102.68	5.36	1698.63–2131.93	$\pm 51.10$
XXVII		% of time referred to a standard yeast	18	114.55	3.90	3.40	106.32–122.78	$\pm 1.94$
XXVIII		time in min	17	149.70	17.56	11.73	112.47–186.93	$\pm 9.04$

 $t_{0.05}$  is a statistical constant for the risk of 5%

Table 2 Statistical calculation of the data obtained through methods based on a manometric test

Laboratory	Test-method	Readings	Number of samples tested $n$	Mean of the series $\bar{x}$	Standard deviation $s$	Standard deviation as % of the mean $\frac{s}{\bar{x}} \cdot 100$	Confidence intervals for the single value $\bar{x} \pm t_{0.05} \cdot s$	Limits of the mean $t_{0.05} \cdot \frac{s}{\sqrt{n}}$
I	CO <sub>2</sub> evolution from a thin slurry of flour	mm of pressure after 3 h	18	251.22	30.42	12.11	187.03– 315.41	$\pm 15.14$
III	CO <sub>2</sub> evolution from a thin slurry of flour	mm of pressure after 6 h	18	481.05	118.54	24.64	230.93– 731.17	$\pm 58.99$
IV	Burrows and Harrison Fermentometer (modified)	ml after 1 h	18	173.44	24.22	13.96	122.34– 224.54	$\pm 12.05$
V	Burrows and Harrison Fermentometer	ml after 2 h	18	453.28	70.82	15.62	303.85– 602.71	$\pm 35.24$
VI	Burrows and Harrison Fermentometer	ml after 180 min	16	71.31	5.38	7.54	59.85– 82.77	$\pm 2.86$
VII	Burrows and Harrison Fermentometer	ml after 90 min	18	40.88	4.28	10.47	31.85– 49.91	$\pm 2.13$
VIII	Burrows and Harrison Fermentometer	ml after 90 min	18	115.61	14.83	12.83	84.32– 146.90	$\pm 7.38$
IX	CO <sub>2</sub> evolution from a thin slurry of flour	ml after 180 min	18	10.34	4.78	46.23	0.25– 20.43	$\pm 2.38$
X	Burrows and Harrison Fermentometer (modified)	ml after 180 min	17	143.94	20.18	14.02	101.16– 186.72	$\pm 10.38$
XI	Burrows and Harrison Fermentometer	ml after 180 min	18	43.83	11.95	27.26	18.62– 69.04	$\pm 5.95$
XII	Burrows and Harrison Fermentometer	ml after 90 min	18	36.33	5.46	15.03	24.81– 47.85	$\pm 2.72$
XIII	Burrows and Harrison Fermentometer	ml after 90 min	18	42.95	3.22	7.50	36.16– 49.74	$\pm 1.60$
XIV	CO <sub>2</sub> evolution, time required to reach a standard pressure	% of time referred to a standard yeast	18	116.67	4.24	3.63	107.72– 125.62	$\pm 2.11$
XV	Burrows and Harrison Fermentometer	ml after 135 min	17	25.07	5.42	21.62	13.58– 36.56	$\pm 2.79$

$t_{0.05}$  is a statistical constant for the risk of 5%

Table 3 Statistical comparison between laboratories and flours (Burrows and Harrison)

Laboratories	No. of samples tested	Readings	Red yeast		Green yeast		Grey yeast		Black yeast	
			F test between Laboratories		F test between Laboratories		F test between Laboratories		F test between Laboratories	
IV, V, XI, XVIII, XXI	7 7	45 min 90 min	5.1 (2.78) 602.5 (2.78)	1.4 (2.51) 19.9 (2.51)						
IV, V, XI, XVIII, XXI	7 7	45 min 90 min			30.3 (2.78) 707.3 (2.78)	9.1 (2.51) 8.11(2.51)				
IV, V, XI, XVIII, XXI	7 7	45 min 90 min					3.1 (2.78) 274.8 (2.78)	0.52 (2.51) 1.64 (2.51)		
IV, V, XI, XVIII, XXI	7 7	45 min 90 min							4.76(2.78) 2659.1 (2.78)	17.8 (2.51) 120.9 (2.51)
V, XVIII, XXI	15 15	45 min 90 min	15.3 (3.34) 879.6 (3.34)	1.41 (2.12) 6.91 (2.12)						
V, XVIII, XXI	15 15	45 min 90 min			29.3 (3.34) 2656.7 (3.34)	2.8 (2.12) 7.5 (2.12)				
V, XVIII, XXI	15 15	45 min 90 min					2.93(3.34) 357.5 (3.34)	0.51 (2.12) 0.65 (2.12)		
V, XVIII, XXI	15 15	45 min 90 min							1.99(3.34) 1257.9 (3.34)	2.46 (2.12) 7.74 (2.12)

Note: In the F test column the number enclosed within brackets shows  $F_{5\%}$  critical from SNEDECOR's tables and italics shows that differences are not significant at 5% level

Table 4 Statistical comparison between laboratories and flours (SJA apparatus without faninograph)

Laboratories	No. of samples tested	Readings	Red yeast		Green yeast		Grey yeast		Black yeast	
			F test		F test		F test		F test	
			Laboratories	Flours	Laboratories	Flours	Laboratories	Flours	Laboratories	Flours
VII, XII, XIII, XVIII, XXI, XXIII	16	(450 ml), min	66.9 (2.35)	1.12 (1.89)						
	16	1st h, ml	62.9 (2.35)	1.17 (1.89)						
	16	2nd h, ml	28.5 (2.35)	6.49 (1.89)						
	16	3rd h, ml	16.1 (2.35)	14.2 (1.89)						
V, VII, VIII, XII, XIII, XVIII, XXI, XXIII	16	(450 ml), min			57.1 (2.1)	0.80 (1.80)				
	16	1st h, ml			54.7 (2.1)	0.55 (1.80)				
	16	2nd h, ml			32.9 (2.1)	2.82 (1.80)				
	16	3rd h, ml			16.2 (2.1)	20.3 (1.80)				
VII, VIII, XII, XIII, XVIII, XXI, XXIII	16	(450 ml), min					24.6 (2.21)	0.67 (1.87)		
	16	1st h, ml					81.0 (2.21)	0.30 (1.87)		
	16	2nd h, ml					43.9 (2.21)	1.34 (1.87)		
	16	3rd h, ml					19.7 (2.21)	14.4 (1.87)		
V, VII, VIII, XII, XIII, XVIII, XXI(-1), XXIII	16	(450 ml), min							88.7 (2.1)	1.07 (1.80)
	16	1st h, ml							86.6 (2.1)	1.26 (1.80)
	16	2nd h, ml							15.5 (2.1)	9.3 (1.80)
	16	3rd h, ml							21.2 (2.1)	24.3 (1.80)

Notes: (1) In the Laboratory column the number enclosed within brackets points out how many flours have been tested by the Laboratory at issue in comparison with the total number shown in the following column

(2) In the F test column the number enclosed within brackets shows F<sub>5%</sub> critical from SNEDECOR's tables and italics shows that differences are not significant at 5% level



Table 5 Statistical comparison among yeasts-SJA method (minutes for 450 ml)

Laboratory	No. of flour samples tested	No. of yeast samples tested	F test among yeasts
V	10	4	<i>0.39</i> (2.96)
VII	16	4	<i>2.03</i> (2.82)
VIII	16	3	77.8 (3.32)
X	8	4	14.4 (3.07)
XII	16	4	11.03 (2.82)
XIII	16	4	21.6 (2.82)
XVII	14	4	14.5 (2.84)
XVIII	16	4	58.8 (2.82)
XXI	16	4	19.3 (2.82)
XXII	15	4	23.4 (2.84)
XXIII	16	4	4.03 (2.82)

Note: In the F test column the number enclosed within brackets shows  $F_{5\%}$  critical from SNEDECOR's tables and italics shows that differences are not significant at 5% level

Table 6 Statistical calculation of the data obtained through SJA method  
(minutes for 450 ml)

Laboratory	Yeast	No. of samples tested $n$	Mean of the series $\bar{x}$	Standard deviation $s$	Standard deviation as % of the mean $\frac{s}{\bar{x}} \cdot 100$	Confidence intervals for the single value $\bar{x} \pm t_{0.05} \cdot s$	Limits of the mean $\frac{t_{0.05} \cdot s}{\sqrt{n}}$
V	Red	10	53.60	2.05	3.82	48.97–58.23	$\pm 1.46$
	Green	16	52.44	3.50	6.67	45.02–59.86	$\pm 1.86$
	Grey	10	56.00	4.60	8.21	45.60–66.40	$\pm 3.23$
	Black	16	53.12	2.85	5.36	47.08–59.16	$\pm 1.51$
VII	Red	16	52.00	1.71	3.29	48.37–55.63	$\pm 0.91$
	Green	16	54.12	3.37	6.23	46.98–61.26	$\pm 1.79$
	Grey	16	58.94	4.09	6.94	50.27–67.61	$\pm 2.17$
	Black	16	53.06	2.05	3.86	48.71–57.41	$\pm 1.09$
VIII	Red	–	–	–	–	–	–
	Green	16	65.37	5.30	8.11	54.13–76.61	$\pm 2.81$
	Grey	16	76.00	6.65	8.75	61.90–90.70	$\pm 3.52$
	Black	16	59.50	1.97	3.31	55.32–63.68	$\pm 1.04$
X	Red	8	53.75	2.61	4.85	47.49–60.01	$\pm 2.38$
	Green	8	50.50	2.27	4.49	45.05–55.95	$\pm 1.93$
	Grey	8	57.37	2.56	4.46	51.23–63.51	$\pm 2.17$
	Black	8	53.50	3.07	5.74	46.13–60.87	$\pm 2.61$
XII	Red	16	50.69	2.98	5.88	44.37–57.01	$\pm 1.58$
	Green	16	48.00	1.27	2.64	45.31–50.69	$\pm 0.67$
	Grey	16	51.94	3.33	6.41	44.88–59.00	$\pm 1.76$
	Black	16	48.19	1.46	3.03	45.09–51.29	$\pm 0.77$
XIII	Red	16	53.62	2.19	4.08	48.98–58.26	$\pm 1.16$
	Green	16	51.00	1.79	3.51	47.21–54.79	$\pm 0.95$
	Grey	16	56.06	2.41	4.30	50.95–61.17	$\pm 1.28$
	Black	16	51.56	2.48	4.81	46.30–56.82	$\pm 1.31$
XVII	Red	14	55.14	4.85	8.79	44.86–65.42	$\pm 2.75$
	Green	14	48.43	2.09	4.31	44.00–52.86	$\pm 1.18$
	Grey	14	55.43	1.98	3.57	51.23–59.63	$\pm 1.12$
	Black	14	52.64	2.95	5.60	46.39–58.89	$\pm 1.67$
XVIII	Red	16	53.91	2.81	5.21	47.95–59.87	$\pm 1.49$
	Green	16	55.44	2.92	5.27	49.25–61.63	$\pm 1.55$
	Grey	16	66.81	5.84	8.74	54.43–79.19	$\pm 3.10$
	Black	16	52.19	1.67	3.20	48.65–55.73	$\pm 0.89$
XXI	Red	16	67.44	5.77	8.56	55.11–79.77	$\pm 3.06$
	Green	16	61.38	3.65	5.95	53.64–69.12	$\pm 1.93$
	Grey	16	70.94	6.18	8.71	57.84–84.04	$\pm 3.28$
	Black	15	63.53	3.68	5.79	55.73–71.33	$\pm 2.01$
XXII	Red	15	48.80	2.36	4.84	43.80–53.80	$\pm 1.29$
	Green	15	48.80	2.20	4.51	44.14–53.46	$\pm 1.20$
	Grey	15	52.80	2.59	4.90	47.31–58.29	$\pm 1.40$
	Black	15	47.73	1.58	3.31	44.38–51.08	$\pm 0.86$
XXIII	Red	16	49.06	2.11	4.30	44.59–53.53	$\pm 1.12$
	Green	16	48.06	2.46	5.12	42.84–53.28	$\pm 1.30$
	Grey	16	49.94	1.77	3.54	46.19–53.69	$\pm 0.94$
	Black	16	46.94	3.22	6.86	40.11–53.77	$\pm 1.71$

## REPORTS ON IUPAC ACTIVITIES

### II<sup>ND</sup> INTERNATIONAL SYMPOSIUM ON CAROTENOIDS OTHER THAN VITAMIN A

*Las Cruces, New Mexico (USA), 6-9 May 1969*

The Second International Symposium on Carotenoids other than Vitamin A was held at New Mexico State University, Las Cruces, New Mexico (USA), with sponsorship by IUPAC (Organic Chemistry Division). Financial support was received from Hoffmann-LaRoche, Nutley, New Jersey; National Science Foundation; and New Mexico State University. The program was arranged by Prof. B. C. L. WEEDON, Dr S. L. JENSEN, Prof. T. W. GOODWIN and Prof. O. B. WEEKS and details of the meeting by Dr J. D. SURMATIS, Prof. C. O. CHICHESTER and Prof. O. B. WEEKS (Chairman).

The scientific program included plenary lectures, session lectures and contributed research papers on the three general topics: "Physical-organic techniques in structural studies of carotenoids"; "Structure and synthesis of natural carotenoids"; and "Biosynthesis and function of carotenoids". The plenary and session lectures were:

Dr U. SCHWIETER (Hoffmann-La Roche, Basle, Switzerland): "Physical-organic methods in carotenoid research" (plenary lecture)

Dr M. B. HURSTHOUSE (Queen Mary College, London): "X-ray crystallographic studies" (session lecture)

Prof. B. C. L. WEEDON (Queen Mary College, London): "Optical rotatory dispersion studies on carotenoids" (session lecture)

Dr CURT ENZELL (Swedish Tobacco Co., Stockholm): "Mass spectrometric studies of carotenoids" (session lecture)

Dr SYNNOVE L. JENSEN (Norwegian Technical University, Trondheim): "Selected examples of structure determination of natural carotenoids" (plenary lecture)

Prof. C. BODEA (Institutul de Chimie, Cluj, Romania): "Cyclization reactions of carotenoids *in vivo* and *in vitro*" (session lecture)

Prof. B. C. L. WEEDON (Queen Mary College, London): "Some recent advances in synthesis of carotenoids" (session lecture)

Mr A. G. ANDREWES (New Mexico State University, Las Cruces): "Carotenoids of *Flavobacterium dehydrogenans*" (session lecture)

Dr B. H. DAVIES (University College of Wales, Aberystwyth): "Structure studies of bacterial carotenoids and their biosynthetic implications" (session lecture)

Dr J. W. PORTER (University of Wisconsin, Madison): "Studies on enzymic synthesis of carotenoids and related compounds" (plenary lecture)

Prof. T. W. GOODWIN (University of Liverpool, England): "Stereospecific biosynthesis of carotenoids particularly xanthophylls" (plenary lecture)

Dr CHRISTOPHER FOOTE (University of California, Los Angeles): "Carotenoids in photooxidation" (session lecture)

Dr H. YAMAMOTO (University of Hawaii, Honolulu): "Recent studies on carotenoid function in photosynthesis" (session lecture)

In addition the program included 16 contributed research papers. Approximately 75 persons from Great Britain, Europe and the United States attended the symposium.

The plenary lectures and selected session lectures will be published by IUPAC in *Pure and Applied Chemistry* and may be obtained as a separate publication from Butterworths, London. Session lectures not published and abstracts of contributed papers will be collated and sent to symposium participants by the Program Chairman.

An informal meeting was held after the banquet and it was decided to continue the international meetings possibly on a triennial basis with the next meeting to be held in Europe during 1972. A semiannual newsletter will be commenced with Dr S. L. JENSEN, Norwegian Technical University, Trondheim, and Prof. O. B. WEEKS, New Mexico State University, Las Cruces, initiating the venture.

## **INTERNATIONAL SYMPOSIUM ON ANALYTICAL CHEMISTRY**

*Birmingham (UK), 21–25 July 1969*

The Fourth International Symposium on Analytical Chemistry held by the Midlands Section of the Society for Analytical Chemistry, took place at the University of Birmingham over the period 21–25 July, under the auspices of IUPAC.

This Symposium, which was held as closely as possible to Prof. RONALD BELCHER'S 60th Birthday, has been acclaimed the most successful of the four Birmingham Symposia, and Prof. BELCHER'S standing in the analytical field no doubt contributed to the high quality of the papers delivered and to the record attendance of 585 delegates and guests from 32 countries.

The 6 plenary lectures presented will be published in book form, early in 1970 and will also appear in *Pure and Applied Chemistry*. These were:

- “Analytical methods for the study of air pollution”, by Prof. PHILIP W. WEST, of the Environmental Sciences Institute, Coates Chemical Laboratories, Louisiana State University, Baton Rouge, La. (USA)
- “Analytical applications of stripping processes in voltammetry”, by Prof. WIKTOR KEMULA, of the Institute of Chemical Physics, Polish Academy of Sciences, Warsaw (Poland)
- “The analytical chemistry of mixed ligand complexes”, by Prof. IVAN P. ALIMARIN, of the Institute of Analytical Chemistry, M.V. Lomonosov Moscow State University, and the V.I. Vernadsky Institute of Geochemistry, Russian Academy of Sciences, Moscow (USSR)
- “The present status of electron microprobe analysis”, by Prof. HANS MALISSA, of the Institute of Analytical Chemistry, Technical University of Vienna (Austria)
- “The present status of organic microanalysis”, by Dr WOLFGANG SCHÖNIGER of the Microanalytical Laboratories, Sandoz AG, Basle (Switzerland)
- “Forensic science and the analyst”, by Prof. CECIL L. WILSON, of the Chemistry Department, Queens University, Belfast (Northern Ireland)

The Scientific Programme also included three concurrent streams of non-plenary lectures in which a total of over 100 papers was presented. Summaries of all lectures were published in the Symposium Handbook. Most fields of analytical chemistry were covered, e.g., separation processes, polarography, flame methods, organic reagents,



standards and standardization, newer instrumental techniques, electrochemical analysis, gas chromatography and volatile chelates, catalytic analysis, ion-selective electrodes, and thermal analysis.

The Social Programme included a "Mixer", and Civic Reception by His Right Worshipful the Lord Mayor of Birmingham, a Symposium Dinner and a Buffet Reception provided jointly by local industry and the University of Birmingham. A full day was devoted almost exclusively to outings and visits to several local industrial firms, followed by entertainment in the evening at the Royal Shakespeare Theatre, Stratford on Avon, or the Belgrade Theatre, Coventry. A full programme of visits was arranged over the week for Lady Guests.

An Exhibition of Scientific Equipment, in which 50 manufacturers participated, was held in conjunction with the Symposium.

The Symposium was the occasion for many presentations, Prof. BELCHER was the honoured recipient of many of these, which included the presentation of the Lomonosov Medal by Prof. I. P. ALIMARIN, the Golden Eagle of the Austrian Microchemical Society by Prof. H. MALISSA, a view of Graz as it was about 300 years ago, printed on silk, and presented by Prof. H. SPITZY, a birthday cake (subsequently enjoyed by all the delegates) from the American Microchemical Society, presented by Mr HOWARD J. FRANCIS, the Mendeleev Medal, presented by Prof. R. P. LASTOVSKY, and, on behalf of the French delegation, a silver Loving Cup presented by Prof. C. DUVAL.

On behalf of all the delegates, the Symposium Chairman (Mr W. T. ELWELL) presented Prof. BELCHER with a Georgian silver teapot, sugar bowl and milk jug, and Mr G. F. RICHARDS of Pergamon Press presented a specially-bound copy of the *Talanta Honour Issue*.

Dr ALAN WALSH received the Talanta Gold Medal from Prof. BELCHER, Prof. L. ERDEY presented the Hevesey Medal to Dr A. A. SMALES, Past-President of the Society.

#### **IV<sup>TH</sup> INTERNATIONAL CONFERENCE ON ORGANOMETALLIC CHEMISTRY**

*Bristol (UK), 27 July–2 August 1969*

The IVth International Conference on Organometallic Chemistry, sponsored by The Chemical Society of London and IUPAC, was held in Bristol (UK).

The Conference was devoted to a wide ranging discussion of the preparation, properties and uses of organometallic compounds, with a good balance between work on transitional and non-transitional metal compounds.

Approximately 500 scientists attended the Conference accompanied by about 60 wives and children. A total of 220 communications was presented at the Conference in four parallel sessions.

Plenary lectures delivered at the Conference were:

T. L. BROWN, University of Illinois (USA): "Recent advances in Group I and II organometallic chemistry"

P. CHINI, University of Milan (Italy): "Some aspects of the chemistry of polynuclear metal carbonyls"

- L. F. DAHL, University of Wisconsin, Madison (USA): "Stereochemical and bonding principles in organo (transition metal) complexes: the influence of valence electrons on molecular configuration"
- W. A. G. GRAHAM, University of Alberta, Edmonton (Canada): "Recent developments in the study of metal carbonyl derivatives of silicon, germanium and tin"
- S. P. GUBIN, Institute of Organo-Element Compounds, Moscow (USSR): "Electrochemical methods in the chemistry of organometallic transition metal complexes"
- A. W. JOHNSON, University of Sussex, Brighton (UK): "Transition metal complexes of porphins, corrins and related compounds"
- W. P. NEUMANN, University of Dortmund (Germany): "Recent developments in the chemistry of organic derivatives of Group IV elements"
- R. SCHAEFFER, Indiana University, Bloomington (USA): "Lower carboranes and related chemistry"
- K. SCHLOGL, University of Vienna (Austria): "Configurational and conformational studies in the metallocene field"
- D. SEYFERTH, MIT, Cambridge (USA): "Insertion reactions of phenyl(trihalomethyl)-mercury-derived carbenes"

The abstracts of the communications presented at the Conference form the subject matter of a bound volume, and the plenary lectures will be published in *Pure and Applied Chemistry*, and also as a book by Messrs Butterworths.

The Conference Chairman and Secretary were respectively Prof. F. G. A. STONE and Dr E. W. ABEL.

## **INTERNATIONAL SYMPOSIUM ON MACROMOLECULAR CHEMISTRY**

*Budapest (Hungary), 25–30 August 1969*

The Symposium was organized by the Chemistry Section of the Hungarian Academy of Sciences and sponsored by the International Union of Pure and Applied Chemistry.

Formal opening was held in the "Memosz" Convention Hall in Budapest by the Chairman of the Symposium, Prof. Dr G. SCHAY, followed by the first plenary lecture, entitled:

- "New synthesis—New polymers—New uses", by Prof. H. MARK (USA). The lecture was delivered by Prof. M. GOODMAN (USA) owing to the unexpected illness of the author.

Two further plenary lectures were held at the Closing Session of the Symposium:

- "On polymerization of vinyl compounds and dienes in aqueous emulsions", by Prof. S. S. MEDVEDEV (USSR)
- "New polymer synthesis", by Prof. G. SMETS (Belgium)

Further scientific programs of the Symposium were organized on the campus of the Technical University of Budapest.

The main topics of the Symposium were the kinetics and mechanism of poly-reactions which were discussed in the following 11 sections:

- (1) Polyaddition and polycondensation
- (2) Cationic polymerization
- (3) Anionic polymerization
- (4) Ionic coordination polymerization
- (5) Radical polymerization
- (6) Radiation and photochemical polymerization
- (7) Polymerization in heterogeneous systems
- (8) Polymerization and polycondensation in the solid phase
- (9) Grafting and cross-linking
- (10) Polymer-analogous reactions
- (11) Depolymerization, degradation and stabilization of polymers

Owing to the large number of contributions it was necessary to arrange for 4-5 sessions to meet concurrently.

Both the forenoon and afternoon sessions were preceded by one main lecture, each with a period of 45 minutes.

The main lectures were held as follows:

#### *Section 1*

- S. G. ENTELLS (USSR): "Kinetics and mechanism of the formation of polyurethanes"  
Z. JEDLINSKY (Poland): "Synthesis of new aromatic polyesters"  
C. G. OVERBERGER (USA): "The synthesis and properties of rigid chain asymmetric polyamides"  
N. PLATZER (USA): "Design of continuous and batch addition polymerization processes"  
R. C. SCHULZ (German Federal Republic): "Optically active polyesters and polyamides"

#### *Section 2*

- P. H. PLESCH (UK): "Some problems of the mechanism of cationic polymerization"  
M. L. HUGGINS (USA): "Some macromolecular horizons"

#### *Section 3*

- N. S. ENIKOLOPOV (USSR): "On exchange reactions between polymer chains"  
B. L. ERUSALIMSKY (USSR): "Role of the formation of active complexes in anionic polymerization"  
G. V. SCHULZ (German Federal Republic): "Zustände und Reaktionen des Carbanions bei der anionischen Polymerisation"  
P. SIGWALT (France): "Mechanism and kinetics of the anionic polymerization of episulfides"

#### *Section 4*

- N. M. CHIRKOV (USSR): "Constants of the basic elementary steps and mechanism of the polymerization of olefines catalized by Ziegler-Natta Catalysts"  
B. A. DOLGOPLOSK (USSR): "Ionic-coordination polymerisation of dienes"



- N. G. GAYLORD (USA): "Alternating copolymers from complexed polar monomers"
- W. KERN (German Federal Republic): "Endgruppenbestimmungen und Zahl aktiver Zentren bei der ionischen und koordinativen Polymerisation im heterogenen Medium"
- J. ULBRICHT (German Democratic Republic): "Polymerisation und Copolymerisation polarer Vinylmonomeren mit modifizierten Ziegler-Natta-Katalysatoren"
- M. GOODMAN (USA): "Mechanism of stereoselective and stereoelective copolymerization"

#### *Section 5*

- G. M. BURNETT (UK): "Radical polymerization in solution"
- A. D. JENKINS (UK): "The structure and reactivity of polymer radicals"
- V. A. KABANOV (USSR): "Effect of formation of complexes on radical polymerization processes"
- A. V. TOBOLSKY (USA): "Block polymers through radical polymerization"
- F. TÜDÖS (Hungary): "Some problems of radical polymerization kinetics"
- U. S. NANDI (India): "Some recent advances in radical polymerization"

#### *Section 6*

- K. HAYASHI (Japan): "Active species and initiation mechanism of radiation induced ionic polymerization"

#### *Section 7*

- J. W. BREITENBACH (Austria): "Popcorn polymers and proliferons polymerization"
- H. K. LIVINGSTON (USA): "Adsorption polymerization"

#### *Section 8*

- I. M. BARKALOV (USSR): "On kinetics of solid state polymerization"
- GY. HARDY (Hungary): "Solid state polymerization in two-component systems"

#### *Section 9*

- A. CHAPIRO (France): "Sur quelques problèmes posés par le greffage des polymères par les méthodes radiochimiques"
- H. U. USMANOV (USSR): "Grafting and cross-linking of macromolecules"
- G. RIESS (France): "Influence of block and graft copolymers on the properties of polyblends"

#### *Section 10*

- N. A. PLATE (USSR): "Characteristics of chemical modification of macromolecules related to the polymer state"
- Z. A. ROGOVIN (USSR): "New methods for the chemical modification of celluloses"

#### *Section 11*

- A. A. BERLIN (USSR): "Stabilization and modification of polymers by polyconjugated systems"



- N. GRASSIE (UK): "The thermal degradation of copolymers"  
 H. H. G. JELLINEK (USA): "Polymer-gas (air pollutants) degradation reactions"  
 A. A. KUZMINSKY (USSR): "On oxidation and stabilization of polymers"  
 J. POSPÍŠIL (CSSR): "Structure of phenolic antioxidants and their effectiveness in polypropylene"

The main lectures were followed by the section lectures each with a period of 10 minutes.

A total of 357 section lectures was held at the Symposium.

The summaries of the section lectures were published in a bound volume "Abstracts of Papers" mailed to every potential participant in March 1969. The complete texts of the section lectures were printed in five bound volumes entitled: "Kinetics and Mechanism of Polyreactions, Preprints of Papers." The price of these volumes was included in the participation fee. Further distribution of the volumes has been undertaken by the Publishing House of the Hungarian Academy of Sciences, Budapest.

The plenary and main lectures are to be published in a separate volume.

The Social Program included a reception and a folklore performance given in honour of all active and non-active members, sightseeing, excursions, concerts, working lunches and banquet. A Ladies' Program was also organized.

The Symposium was attended by a total of 880 active members and 200 accompanying persons from the following 25 countries: Austria, Belgium, Bulgaria, Canada, Czechoslovakia, Denmark, France, German Democratic Republic, German Federal Republic, Hungary, India, Italy, Japan, Netherlands, Poland, Romania, Soviet Union, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States, Venezuela, Yugoslavia.

## **INTERNATIONAL SYMPOSIUM ON CONFORMATIONAL ANALYSIS**

*Brussels (Belgium), 8-12 September 1969*

From 8-12 September 1969 was held in Brussels University an International Symposium of Conformational Analysis, placed under the auspices of IUPAC and also under the auspices of: Belgian Chemical Society, Belgian Chemical Industries, Brussels University.

The members of the Scientific Committee were: Prof. G. CHIURDOGLU (Chairman), Prof. J. REISSE (Secretary), Prof. D. H. R. BARTON (London), Prof. A. DREIDING (Zürich), Prof. E. HAVINGA (Leiden), Prof. A. LÜTTRINGHAUS (Freiburg i.Br.), Prof. G. OURISSON (Strasbourg), Prof. V. PRELOG (Zürich), Prof. R. H. MARTIN (Bruxelles), Prof. J. NASIELSKI (Bruxelles), Prof. G. VAN BINST (Bruxelles).

The plenary lectures, which will be published in *Pure and Applied Chemistry*, were given by:

- L. J. OOSTERHOFF (Netherlands): "Energetical bases of conformational analysis"  
 J. D. DUNITZ (Switzerland): "Conformations of medium rings"

- J. F. M. OTH (Belgium): "Conformational mobility and fast bond shift in the annulenes"
- J. SICHER (CSSR): "Bimolecular elimination reactions. Stereochemistry and the scope of conformational analysis"
- M. J. T. ROBINSON (UK): "Conformational equilibria involving substituents lacking conical symmetry"
- E. L. ELIEL (USA): "Insights gained from conformational analysis in heterocyclic systems"
- R. U. LEMIEUX (Canada): "Effects of unshared pairs of electrons and their solvation on conformational equilibria"
- J. DALE (Norway): "Conformational studies of some normal, medium and large ring systems"
- A. RASSAT (France): "Applications de la résonance paramagnétique électronique à l'analyse conformationnelle"
- K. MISLOW (USA): "Aspects of pyramidal inversion and pseudorotation"

Twenty invited communications were delivered by:

- P. PINO (Italy): "Conformational equilibria in low and high molecular weight paraffins"
- J. M. LEHN (France): "Theoretical conformational analysis: Ab initio-SCF-LCAO-MO studies of conformations and of conformational energy barriers. Scope and limitations"
- G. SCHILL (Germany): "New concepts on a synthesis of higher membered catenanes and knots and model investigations"
- H. FELKIN (France): "Solvolytic cyclizations involving double bonds. Conformational effects"
- P. V. VON R. SCHLEYER (USA): "Conformational analysis of carbonium ions"
- J. MCKENNA (UK): "Energetics of isomeric transition states and reaction pathways in conformational analysis"
- E. W. GARBISCH (USA): "Applicability of the temperature dependence of NMR parameters for quantitative conformational analysis"
- R. D. STOLOW (USA): "Recent applications of NMR spectrometry in conformational studies of cyclohexane derivatives"
- J. REISSE (Belgium): "Quantitative conformational analysis of cyclohexanic systems"
- F. A. L. ANET (USA): "NMR studies of the conformations and conformational barriers in cyclic molecules"
- M. J. O. ANTEUNIS (Belgium): "Results and limitations in conformational studies of six membered heterocycles"
- H. FRIEBOLIN (Germany): "Die Konformationen und die konformativen Umwandlungen gesättigter Siebenringe"
- V. T. IVANOV (USSR): "Conformations of membrane active cyclodepsipeptides"
- G. FODOR (Canada): "Conformational effects in N-quaternizations. A combined chemical and NMR study"
- R. E. LYLE (USA): "Studies of the conformation of nitrogen heterocycles"
- J. I. MUSER (USA): "Conformational problems in organic hypervalent molecules"
- K. J. ONODERA (Japan): "Conformational studies on the sugar moieties of some  $\alpha$ -glycopyranosyl nucleoside analogues, sugar nucleotides and related substances"
- H. H. WESTEN (Switzerland): "Contributions to the conformational analysis of the ten-membered carbon ring"

C. ALTONA (Netherlands): "Geometry and conformational properties of five-membered ring compounds"

R. BUCOURT (France): "Récents progrès en analyse conformationnelle à l'aide des angles dièdres. Transmission conformationnelle et stabilités de doubles liaisons en série stéroïde"

The number of participants was approximately 500, coming from more than thirty countries.

The level of plenary lectures, papers and discussions was extremely high and this first international symposium on conformational analysis has given a very good opportunity for workers in this field to meet and to discuss.

Most of the plenary lectures and invited papers were centered around the following topics:

- Application of quantum mechanical calculations to the prediction of molecular shape and energy, including charged species
- Classical semi-empirical methods used to estimate shapes and energies of complex molecules, such as steroids
- Experimental data gained by physical methods (mainly NMR), thermodynamic and kinetic studies for cyclic molecules. Extension to six-membered rings containing heteroatoms, with emphasis on inter- and intramolecular dipolar interactions
- Conformational equilibrium and conformation in reaction mechanisms
- Pseudorotation in trigonal bipyramidal species and topological representation of the process; pyramidal inversion
- Less common experimental techniques, such as X-rays and EPR
- Conformational analysis of rings higher than six-membered, such as oligopeptides. Rationalization of the results derived from the conformational analysis of medium and large rings

14. Table of Atomic Weights 1969

BASED ON THE ASSIGNED RELATIVE ATOMIC MASS OF  $^{12}\text{C} = 12$

The following values apply to elements as they exist in materials of terrestrial origin and to certain artificial elements. When used with due regard to the footnotes, they are considered reliable to  $\pm 1$  in the last digit, or  $\pm 3$  if that digit is in small type.

Alphabetical Order in English

Name	Symbol	Atomic Number	Atomic Weight	Name	Symbol	Atomic Number	Atomic Weight
Actinium	Ac	89	..	Copper	Cu	29	63.546 <sup>c,d</sup>
Aluminium	Al	13	26.9815 <sup>a</sup>	Curium	Cm	96	..
Americium	Am	95	..	Dysprosium	Dy	66	162.5 <sub>0</sub>
Antimony	Sb	51	121.7 <sub>5</sub>	Einsteinium	Es	99	..
Argon	Ar	18	39.948 <sup>b,c,d,g</sup>	Erbium	Er	68	167.2 <sub>6</sub>
Arsenic	As	33	74.9216 <sup>a</sup>	Europium	Eu	63	151.96
Astatine	At	85	..	Fermium	Fm	100	..
Barium	Ba	56	137.3 <sub>4</sub>	Fluorine	F	9	18.9984 <sup>a</sup>
Berkelium	Bk	97	..	Francium	Fr	87	..
Beryllium	Be	4	9.01218 <sup>a</sup>	Gadolinium	Gd	64	157.2 <sub>5</sub>
Bismuth	Bi	83	208.9806 <sup>a</sup>	Gallium	Ga	31	69.72
Boron	B	5	10.81 <sup>c,d,e</sup>	Germanium	Ge	32	72.5 <sub>9</sub>
Bromine	Br	35	79.904 <sup>c</sup>	Gold	Au	79	196.9665 <sup>a</sup>
Cadmium	Cd	48	112.40	Hafnium	Hf	72	178.4 <sub>9</sub>
Calcium	Ca	20	40.08	Helium	He	2	4.00260 <sup>b,c</sup>
Californium	Cf	98	..	Holmium	Ho	67	164.9303 <sup>a</sup>
Carbon	C	6	12.011 <sup>b,d</sup>	Hydrogen	H	1	1.008 <sub>0</sub> <sup>b,d</sup>
Cerium	Ce	58	140.12	Indium	In	49	114.82
Cesium	Cs	55	132.9055 <sup>a</sup>	Iodine	I	53	126.9045 <sup>a</sup>
Chlorine	Cl	17	35.453 <sup>c</sup>	Iridium	Ir	77	192.2 <sub>2</sub>
Chromium	Cr	24	51.996 <sup>c</sup>	Iron	Fe	26	55.84 <sub>7</sub>
Cobalt	Co	27	58.9332 <sup>a</sup>	Krypton	Kr	36	83.80



Name	Symbol	Atomic Number	Atomic Weight	Name	Symbol	Atomic Number	Atomic Weight
Lanthanum	La	57	138.905 <sub>5</sub> <sup>b</sup>	Rhenium	Re	75	186.2
Lawrencium	Lr	103	..	Rhodium	Rh	45	102.9055 <sup>a</sup>
Lead	Pb	82	207.2 <sup>d,g</sup>	Rubidium	Rb	37	85.467 <sub>8</sub> <sup>c</sup>
Lithium	Li	3	6.941 <sup>c,d,e</sup>	Ruthenium	Ru	44	101.07
Lutetium	Lu	71	174.97	Samarium	Sm	62	150.4
Magnesium	Mg	12	24.305 <sup>c</sup>	Scandium	Sc	21	44.9559 <sup>a</sup>
Manganese	Mn	25	54.9380 <sup>a</sup>	Selenium	Se	34	78.9 <sub>6</sub>
Mendelevium	Md	101	..	Silicon	Si	14	28.086 <sup>d</sup>
Mercury	Hg	80	200.5 <sub>9</sub>	Silver	Ag	47	107.868 <sup>c</sup>
Molybdenum	Mo	42	95.9 <sub>4</sub>	Sodium	Na	11	22.9898 <sup>a</sup>
Neodymium	Nd	60	144.24	Strontium	Sr	38	87.62 <sup>g</sup>
Neon	Ne	10	20.17 <sub>9</sub> <sup>c</sup>	Sulfur	S	16	32.06 <sup>d</sup>
Neptunium	Np	93	237.0482 <sup>b,f</sup>	Tantalum	Ta	73	180.947 <sub>9</sub> <sup>b</sup>
Nickel	Ni	28	58.7 <sub>1</sub>	Technetium	Tc	43	98.9062 <sup>f</sup>
Niobium	Nb	41	92.9064 <sup>a</sup>	Tellurium	Te	52	127.6 <sub>0</sub>
Nitrogen	N	7	14.0067 <sup>b,c</sup>	Terbium	Tb	65	158.9254 <sup>a</sup>
Nobelium	No	102	..	Thallium	Tl	81	204.3 <sub>7</sub>
Osmium	Os	76	190.2	Thorium	Th	90	232.0381 <sup>a,f</sup>
Oxygen	O	8	15.999 <sub>4</sub> <sup>b,c,d</sup>	Thulium	Tm	69	168.9342 <sup>a</sup>
Palladium	Pd	46	106.4	Tin	Sn	50	118.6 <sub>9</sub>
Phosphorus	P	15	30.9738 <sup>a</sup>	Titanium	Ti	22	47.9 <sub>0</sub>
Platinum	Pt	78	195.0 <sub>9</sub>	Tungsten	W	74	183.8 <sub>5</sub>
Plutonium	Pu	94	..	Uranium	U	92	238.029 <sup>b,c,e</sup>
Polonium	Po	84	..	Vanadium	V	23	50.941 <sub>4</sub> <sup>b,c</sup>
Potassium	K	19	39.10 <sub>2</sub>	Wolfram	W	74	183.8 <sub>5</sub>
Praseodymium	Pr	59	140.9077 <sup>a</sup>	Xenon	Xe	54	131.30
Promethium	Pm	61	..	Ytterbium	Yb	70	173.0 <sub>4</sub>
Protactinium	Pa	91	231.0359 <sup>a,f</sup>	Yttrium	Y	39	88.9059 <sup>a</sup>
Radium	Ra	88	226.0254 <sup>a,f,g</sup>	Zinc	Zn	30	65.3 <sub>7</sub>
Radon	Rn	86	..	Zirconium	Zr	40	91.22

<sup>a</sup> Mononuclidic element.

<sup>b</sup> Element with one predominant isotope (about 99-100% abundance).

<sup>c</sup> Element for which the atomic weight is based on calibrated measurements.

<sup>d</sup> Element for which variation in isotopic abundance in terrestrial samples limits the precision of the atomic weight given.

<sup>e</sup> Element for which users are cautioned against the possibility of large variations in atomic weight due to inadvertent or undisclosed artificial isotopic separation in commercially available materials.

<sup>f</sup> Most commonly available long-lived isotope (see *Table of Selected Radioactive Isotopes*).

<sup>g</sup> In some geological specimens this element has a highly anomalous isotopic composition, corresponding to an atomic weight significantly different from that given.

## 15. Table of Atomic Weights 1969

BASED ON THE ASSIGNED RELATIVE ATOMIC MASS OF  $^{12}\text{C} = 12$

The following values apply to elements as they exist in materials of terrestrial origin and to certain artificial elements. When used with due regard to the footnotes, they are considered reliable to  $\pm 1$  in the last digit, or  $\pm 3$  if that digit is in small type.

### Order of Atomic Number

Atomic Number	Name	Symbol	Atomic Weight	Atomic Number	Name	Symbol	Atomic Weight
1	Hydrogen	H	1.008 <sup>o,b,d</sup>	42	Molybdenum	Mo	95.94
2	Helium	He	4.00260 <sup>b,c</sup>	43	Technetium	Tc	98.9062 <sup>f</sup>
3	Lithium	Li	6.941 <sup>c,d,e</sup>	44	Ruthenium	Ru	101.07
4	Beryllium	Be	9.01218 <sup>a</sup>	45	Rhodium	Rh	102.9055 <sup>a</sup>
5	Boron	B	10.81 <sup>c,d,e</sup>	46	Palladium	Pd	106.4
6	Carbon	C	12.011 <sup>b,d</sup>	47	Silver	Ag	107.868 <sup>c</sup>
7	Nitrogen	N	14.0067 <sup>b,c</sup>	48	Cadmium	Cd	112.40
8	Oxygen	O	15.9994 <sup>b,c,d</sup>	49	Indium	In	114.82
9	Fluorine	F	18.9984 <sup>a</sup>	50	Tin	Sn	118.69
10	Neon	Ne	20.179 <sup>c</sup>	51	Antimony	Sb	121.75
11	Sodium	Na	22.9898 <sup>a</sup>	52	Tellurium	Te	127.60
12	Magnesium	Mg	24.305 <sup>c</sup>	53	Iodine	I	126.9045 <sup>a</sup>
13	Aluminium	Al	26.9815 <sup>a</sup>	54	Xenon	Xe	131.30
14	Silicon	Si	28.086 <sup>d</sup>	55	Cesium	Cs	132.9055 <sup>a</sup>
15	Phosphorus	P	30.9738 <sup>a</sup>	56	Barium	Ba	137.34
16	Sulfur	S	32.06 <sup>d</sup>	57	Lanthanum	La	138.9055 <sup>b</sup>
17	Chlorine	Cl	35.453 <sup>c</sup>	58	Cerium	Ce	140.12
18	Argon	Ar	39.948 <sup>b,c,d,g</sup>	59	Praseodymium	Pr	140.9077 <sup>a</sup>
19	Potassium	K	39.102	60	Neodymium	Nd	144.24
20	Calcium	Ca	40.08	61	Promethium	Pm	..
21	Scandium	Sc	44.9559 <sup>a</sup>	62	Samarium	Sm	150.4
22	Titanium	Ti	47.90	63	Europium	Eu	151.96
23	Vanadium	V	50.9414 <sup>b,c</sup>	64	Gadolinium	Gd	157.25
24	Chromium	Cr	51.996 <sup>c</sup>	65	Terbium	Tb	158.9254 <sup>a</sup>
25	Manganese	Mn	54.9380 <sup>a</sup>	66	Dysprosium	Dy	162.50
26	Iron	Fe	55.847	67	Holmium	Ho	164.9303 <sup>a</sup>
27	Cobalt	Co	58.9332 <sup>a</sup>	68	Erbium	Er	167.26
28	Nickel	Ni	58.71	69	Thulium	Tm	168.9342 <sup>a</sup>
29	Copper	Cu	63.546 <sup>c,d</sup>	70	Ytterbium	Yb	173.04
30	Zinc	Zn	65.37	71	Lutetium	Lu	174.97
31	Gallium	Ga	69.72	72	Hafnium	Hf	178.49
32	Germanium	Ge	72.59	73	Tantalum	Ta	180.9479 <sup>b</sup>
33	Arsenic	As	74.9216 <sup>a</sup>	74	Wolfram (Tungsten)	W	183.85
34	Selenium	Se	78.96	75	Rhenium	Re	186.2
35	Bromine	Br	79.904 <sup>c</sup>	76	Osmium	Os	190.2
36	Krypton	Kr	83.80	77	Iridium	Ir	192.22
37	Rubidium	Rb	85.4678 <sup>c</sup>	78	Platinum	Pt	195.09
38	Strontium	Sr	87.62 <sup>g</sup>	79	Gold	Au	196.9665 <sup>a</sup>
39	Yttrium	Y	88.9059 <sup>a</sup>	80	Mercury	Hg	200.59
40	Zirconium	Zr	91.22	81	Thallium	Tl	204.37
41	Niobium	Nb	92.9064 <sup>a</sup>	82	Lead	Pb	207.2 <sup>d,g</sup>

Atomic Number	Name	Symbol	Atomic Weight	Atomic Number	Name	Symbol	Atomic Weight
83	Bismuth	Bi	208.9806 <sup>a</sup>	94	Plutonium	Pu	..
84	Polonium	Po	..	95	Americium	Am	..
85	Astatine	At	..	96	Curium	Cm	..
86	Radon	Rn	..	97	Berkelium	Bk	..
87	Francium	Fr	..	98	Californium	Cf	..
88	Radium	Ra	226.0254 <sup>a, f, g</sup>	99	Einsteinium	Es	..
89	Actinium	Ac	..	100	Fermium	Fm	..
90	Thorium	Th	232.0381 <sup>a, f</sup>	101	Mendelevium	Md	..
91	Protactinium	Pa	231.0359 <sup>a, f</sup>	102	Nobelium	No	..
92	Uranium	U	238.029 <sup>b, c, e</sup>	103	Lawrencium	Lr	..
93	Neptunium	Np	237.0482 <sup>b, f</sup>				

<sup>a</sup> Mononuclidic element.

<sup>b</sup> Element with one predominant isotope (about 99-100% abundance).

<sup>c</sup> Element for which the atomic weight is based on calibrated measurements.

<sup>d</sup> Element for which variation in isotopic abundance in terrestrial samples limits the precision of the atomic weight given.

<sup>e</sup> Element for which users are cautioned against the possibility of large variations in atomic weight due to inadvertent or undisclosed artificial isotopic separation in commercially available materials.

<sup>f</sup> Most commonly available long-lived isotope (see *Table of Selected Radioactive Isotopes*).

<sup>g</sup> In some geological specimens this element has a highly anomalous isotopic composition, corresponding to an atomic weight significantly different from that given.

## 16. Table of Selected Radioactive Isotopes

### Order of Atomic Number

This table lists selected isotopes of the chemical elements, whether occurring in nature or known only through synthesis, that are commonly classed as radioactive. The listed isotopes include the one of longest known half-life and others of recognized interest. Decay modes with intensities below 0.01% are not mentioned.

Atomic Number	Name	Symbol	Isotope	Half-Life*	Decay Mode**
43	Technetium	Tc	97	$2.6 \cdot 10^6$ y	EC
43	Technetium	Tc	99	$2.14 \cdot 10^5$ y	$\beta^-$
61	Promethium	Pm	145	18.0 y	EC
61	Promethium	Pm	147	2.62 y	$\beta^-$
84	Polonium	Po	209	$1.0 \cdot 10^2$ y	$\alpha$ , EC
84	Polonium	Po	210	138.4 d	$\alpha$
85	Astatine	At	210	8.3 h	EC, $\alpha$
86	Radon	Rn	222	3.82 d	$\alpha$
87	Francium	Fr	223	22 m	$\beta^-$
88	Radium	Ra	226	$1.60 \cdot 10^3$ y	$\alpha$
89	Actinium	Ac	227	21.8 y	$\beta^-$ , $\alpha$

Atomic Number	Name	Symbol	Isotope	Half-Life*	Decay Mode**
90	Thorium	Th	232	$1.41 \cdot 10^{10}$ y	$\alpha$
91	Protactinium	Pa	231	$3.26 \cdot 10^4$ y	$\alpha$
92	Uranium	U	233	$1.60 \cdot 10^5$ y	$\alpha$
92	Uranium	U	234	$2.47 \cdot 10^5$ y	$\alpha$
92	Uranium	U	235	$7.0 \cdot 10^8$ y	$\alpha$
92	Uranium	U	238	$4.5 \cdot 10^9$ y	$\alpha$
93	Neptunium	Np	237	$2.14 \cdot 10^6$ y	$\alpha$
94	Plutonium	Pu	238	87 y	$\alpha$
94	Plutonium	Pu	239	$24.3 \cdot 10^3$ y	$\alpha$
94	Plutonium	Pu	240	$6.6 \cdot 10^3$ y	$\alpha$
94	Plutonium	Pu	241	14.2 y	$\beta^-$
94	Plutonium	Pu	242	$3.86 \cdot 10^5$ y	$\alpha$
94	Plutonium	Pu	244	$8.2 \cdot 10^7$ y	$\alpha$ , s.f.
95	Americium	Am	241	435 y	$\alpha$
95	Americium	Am	243	$7.4 \cdot 10^3$ y	$\alpha$
96	Curium	Cm	242	164 d	$\alpha$
96	Curium	Cm	243	32 y	$\alpha$ , EC
96	Curium	Cm	244	18.1 y	$\alpha$
96	Curium	Cm	245	$8.3 \cdot 10^3$ y	$\alpha$
96	Curium	Cm	246	$4.7 \cdot 10^3$ y	$\alpha$ , s.f.
96	Curium	Cm	247	$1.6 \cdot 10^7$ y	$\alpha$
96	Curium	Cm	248	$3.5 \cdot 10^5$ y	$\alpha$ , s.f.
96	Curium	Cm	250	$1.1 \cdot 10^4$ y	s.f.
97	Berkelium	Bk	247	$1.4 \cdot 10^3$ y	$\alpha$
97	Berkelium	Bk	249	$3.1 \cdot 10^2$ d	$\beta^-$
98	Californium	Cf	251	900 y	$\alpha$
98	Californium	Cf	252	2.64 y	$\alpha$ , s.f.
98	Californium	Cf	254	60.5 d	s.f., $\alpha$
99	Einsteinium	Es	253	20 d	$\alpha$
99	Einsteinium	Es	254	$2.7 \cdot 10^2$ d	$\alpha$
100	Fermium	Fm	257	80 d	$\alpha$ , s.f.
101	Mendelevium	Md	257	3.0 h	EC, $\alpha$ , s.f.
101	Mendelevium	Md	258	54 d	EC, $\alpha$ , s.f.
102	Nobelium	No	255	185 s	$\alpha$ , EC
103	Lawrencium	Lr	256	35 s	$\alpha$

\* s—second; m—minute; h—hour; d—day; y—year.

\*\* EC—electron capture; s.f.—spontaneous fission.



**17. Table of Atomic Masses of Selected Isotopes**

Name	Symbol	Atomic Number	Mass Number	Atomic Mass
Hydrogen	H	1	1	1.00782
Deuterium	D	1	2	2.01410
Tritium	T	1	3	3.01605
Helium	He	2	3	3.01603
			4	4.00260
Lithium	Li	3	6	6.01512
			7	7.01600
Boron	B	5	10	10.0129
			11	11.0093
Carbon	C	6	12	12 exactly
			13	13.0034
			14	14.0032
Nitrogen	N	7	14	14.0031
			15	15.0001
Oxygen	O	8	16	15.9949
			17	16.9991
			18	17.9992
Sulfur	S	16	32	31.9721
			33	32.9715
			34	33.9679
			36	35.9671
Promethium	Pm	61	143	142.9110
			145	144.9128
			147	146.9152
Lead	Pb	82	204	203.9731
			206	205.9745
			207	206.9759
			208	207.9766
Uranium	U	92	233	233.0396
			234	234.0410
			235	235.0439
			236	236.0456
			238	238.0508
Plutonium	Pu	94	238	238.0496
			239	239.0522
			240	240.0538
			241	241.0569
			242	242.0588
			244	244.0642
Curium	Cm	96	242	242.0589
			244	244.0628
			246	246.0672
			247	247.0704
			248	248.0724

## **DETAILED INFORMATION REGARDING FORTHCOMING EVENTS**

### **MACROMOLECULAR DIVISION OF IUPAC**

*Working Party on "The Relationship of Performance Characteristics to Basic Parameters of Polymers"*

#### **Conference on Relaxation Phenomena and Mechanical Properties of Polyvinylchloride**

*Strasbourg (France), 5–6 March 1970*

The Working Party composed of a certain number of research workers from different laboratories has been investigating for several years some commercial samples of polyvinylchloride in order to compare various experimental techniques on the one hand, and to study the relationship between structure and mechanical properties, on the other hand.

To permit a general discussion of the results obtained so far, the Macromolecular Division of IUPAC is organized a conference, under the title "Relaxation Phenomena and Mechanical Properties of Polyvinylchloride" at the Centre de Recherches sur les Macromolécules (CNRS) in Strasbourg, France, on 5 and 6 March 1970.

All active workers in the field of mechanical behaviour and rheological properties of polyvinylchloride were invited to participate in this conference.

For further details, write to the following address:

Secretariat IUPAC  
Macromolecular Division Conference on PVC,  
Centre de Recherches sur les Macromolécules,  
6, rue Boussingault,  
F-67 Strasbourg, France

### **VII<sup>TH</sup> INTERNATIONAL SYMPOSIUM ON THE CHEMISTRY OF NATURAL PRODUCTS**

*Riga (USSR), Pre-symposia: 19–20 June; Symposium: 22–27 June 1970*

#### *Pre-symposia*

Provisional plans have been made to arrange four pre-symposia of restricted scope with a limited number of participants on the following topics:

- Mechanism of enzyme catalysis (Chairman Prof. A. E. BRAUNSTEIN)
- Physicochemical basis of transport through biological membranes (Chairman Prof. L. D. BERGELSON)
- Antibiotics: Chemistry and mode of action (Chairman Prof. A. S. KHOKHLOV)
- Transfer RNA: Structure and functions (Chairman Prof. V. A. ENGELHARDT)

The pre-symposia will be held in Riga, 19–20 June 1970.

For the Symposium cf. *Information Bulletin* 36, pp. 31–32.

## **EUCHEM CONFERENCE: PRINCIPLES OF HETEROCYCLIC SYNTHESIS**

*Co. Kildare (Ireland), 6–10 July 1970*

### *EUCHEM Conferences*

In 1965 the Council of Europe initiated meetings at European venues modelled on the Gordon Conferences. The first of these EUCHEM conferences in Ireland was held at Kinsale in April 1967 on "Inorganic Reaction Mechanisms". In this second conference it is the turn of organic chemistry, and the chosen topic concerns heterocyclic synthesis. We hope that, by bringing acknowledged experts together in agreeable surroundings, useful discussion will be generated which will play a part in the further advancement of the subject and stimulate greater interest in heterocyclic chemistry in Ireland.

### *Scope and speakers*

In recent years a wide variety of heterocyclic compounds has been synthesized by the application of certain general principles. These often involve the incorporation into ring systems of reactive intermediates, the use of a particular reagent, or the extrusion of small inorganic molecules. It was felt that there was a useful element of novelty in focussing attention on such principles and comparing the use of various intermediates. This approach, which should be more profitable than a study of individual ring systems, is on the whole illustrated by the research interests of the overseas speakers who have accepted our invitation to contribute (where the topic indicated has been abbreviated, it is in general to be understood that its significance in heterocyclic synthesis will be under review).

### *Timetable*

Monday, 6 July: Lecture sessions 9.00–12.30; 5.00–6.30. Reception, 9.00  
Tuesday, 7 July: Lecture sessions 9.00–12.30; 5.00–6.30  
Wednesday, 8 July: Lecture sessions 9.00–12.30. Boyne valley trip, 3.00  
Thursday, 9 July: Lecture sessions 9.00–12.30; 5.00–6.30. Conference Dinner, 8.00  
Friday, 10 July: Lecture sessions 9.00–12.30; 5.00–6.30. Conference closes after dinner

J. I. G. CADOGAN (Edinburgh): Triethyl phosphite  
R. GOMPPER (Munich): Keten S, N-acetals and related compounds  
E. GRIGAT (Bayer, Leverkusen): Cyanates  
A. R. KATRITZKY (Norwich): Ring interconversions  
E. KUHLE (Bayer, Leverkusen): Isocyanide dichlorides and related compounds  
D. LEAVER (Edinburgh): Annulenes with internally-bonded N atoms  
R. MAYER (Dresden): Thiocarbonyl compounds  
C. W. REES (Liverpool): Nitrenes from oxidation processes  
M. REGITZ (Saarbrücken): Diazo-group transfer  
S. SAREL (Jerusalem):  $\alpha$ -Lactams

- P. SCHEINER (Mobil, Princeton): Extrusion  
 E. SCHMITZ (Berlin): Diaziridines and oxaziridines (characteristic step, electrophilic amination)  
 R. SLACK (May & Baker, Dagenham): Isothiazoles (examples of N-S bonded rings)  
 P. A. S. SMITH (Michigan): Azides  
 C. B. THOMAS (York): Lead tetra-acetate  
 I. K. UGI (Southern California): Isocyanides  
 H. G. VIEHE (Louvain): Ynamines and their derivatives

In addition, some papers from institutions in Ireland will be presented, again with emphasis on the construction of a variety of heterocycles

- R. G. R. BACON (Queen's University, Belfast): Hydrazine and its derivatives  
 J. DONNELLY (University College, Dublin): Oxetanones  
 R. S. McELHINNEY (MRC Laboratories, Trinity College, Dublin): 3-Heteraglutaraldehydes  
 F. L. SCOTT (University College, Cork): Amino-carbonium ions

#### *Location and travel from Dublin*

Originally planned for St. Patrick's College, Maynooth, the conference is now to be held at Clongowes Wood College, Co. Kildare, about 20 miles south-west of Dublin. Run by the Jesuits, this is one of the biggest boys' schools in the country, and is centred round a castle originating in the 15th century, restored in the 18th; the mediaeval Pale protecting English interests on the east coast ran through the grounds of the castle. Among many distinguished former pupils, perhaps few are better known outside Ireland than the novelist James Joyce.

Those arriving at Dublin Airport on the afternoon or evening of Sunday 5 July should find it convenient to travel to Clongowes on coach (A) which will leave the city Air Terminal at 9 p.m. Those arriving earlier will probably prefer to travel on coach (B) which will leave the Royal Irish Academy, Dawson Street, at 6 p.m. Dawson Street is somewhat more centrally situated than the Air Terminal.

#### *Cost and services provided*

The registration fee of £13 13s 0d includes provision of (a) coach transport from Dublin-Clongowes-Dublin; (b) set of abstracts; (c) opening reception; (d) coach trip to Boyne valley on 8 July; and (e) Conference Dinner on 9 July. The charge for full board from Sunday night-Friday dinner inclusive will be £31 5s 0d. Most of the accommodation will consist of study-bedrooms, the remainder cubicles. Rooms will be allocated on a first come first serve basis and in any case the attendance will be limited to about 100 participants.

The Conference secretary will reserve accommodation at a Dublin hotel for participants before or after the Conference, and for accompanying friends or relatives during it; the latter will be very welcome at the various social events. Approximate cost of bed and breakfast (exclusive of 12% service charge) for single and double rooms respectively are:

Grade A +, 80-110/-, 120-180/-; Grade A, 65/-, 110/-;  
 Grade B, 40/-, 80/- (20/- is £1).



In most cases there is a 33% reduction for children under 10. No pre- or post-Conference trips have been arranged, but a wealth of information on places of interest and holiday resorts in Ireland may be obtained from Mr STEPHEN COATES, Bord Failte Eireann, Upper Stephen Street, Dublin.

### **NATIONAL SYMPOSIUM ON DATA AND INSTRUMENTATION FOR WATER QUALITY MANAGEMENT**

*Madison, Wisconsin (USA), 21-23 July 1970*

The universal applications of the science of water will be discussed by CHARLES ROBINOVE who has been associated with the NASA Earth Resources Program at the luncheon meeting of the National Symposium on Data and Instrumentation to be held at Madison, Wisconsin, 22 July.

ROBINOVE will relate knowledge of hydrology gained from space exploration to some of the water problems facing earth.

The Conference of State Sanitary Engineers, with 16 other professional societies as cosponsors, has scheduled the National Symposium on Data and Instrumentation for Water Quality Management at the University of Wisconsin in Madison, Wisconsin, 21-23 July 1970. Information pertaining to housing, registration fee, program, social events and other details can be obtained by writing to: Mr JAMES E. KERRIGAN, Assistant Director, Water Resources Center, University of Wisconsin, Madison, Wisconsin 53706 (USA).

### **VTH INTERNATIONAL CONFERENCE ON WATER POLLUTION RESEARCH**

*and Second International Exhibition on Water Quality Management,  
Process Equipment, Techniques and Instrumentation*

*San Francisco, California (USA), 26 July-1 August 1970*

This Conference will be organized by the USA National Committee IAWPR and the California Host Committee.

The worldwide increase in industrialization and the population explosion have resulted in increased concern about water quality management and water resource development.

The Fifth International Conference on Water Pollution Research will be held in the Civic Auditorium, San Francisco, 26 July-1 August 1970. It will bring together engineers, scientists and administrators in water quality management in order that recent advances in science and technology of water quality can be discussed and their application considered.

The technical program will feature sessions on eutrophication, waste reclamation, industrial waste treatment, marine waste disposal and water treatment technology.

The objectives of the Conference are to provide a forum for presentation of research findings, to increase communication between scientists and engineers, to stimulate research on water quality management, to shorten the time lag between the presentation of research findings and their application in modern water quality management systems, and to promote international goodwill.

The Second International Equipment Exhibition was planned because of the outstanding success of the First Exhibition held at the Münchener Messe-Gelände (Munich, Germany) in 1966. There were over 150 firms from about 20 nations exhibiting in a total area of about  $3\frac{1}{3}$  acres (13,500 m<sup>2</sup>) of covered exhibition area. Over 10,000 persons visited the exhibition area.

#### *Invitation for abstracts*

Persons interested in participating in the program are invited to submit abstracts of proposed papers. For further information please contact

California Host Committee  
Room 114 McLaughlin Hall, University of California,  
Berkeley, California 94720 (USA)  
Cable address: Waterresearch  
Telex: Telephone (415) 642-3741

#### *Exhibition: 28 July-1 August 1970*

Brooks Hall features 100,000 ft<sup>2</sup> (10,000 m<sup>2</sup>) of exhibition area of the highest quality.

Engineering, scientific, equipment and instrumentation firms planning to exhibit should contact the address listed below immediately.

Rental fees for exhibition area will be approximately \$4.00 to \$6.00 per square foot. Smallest area is 100 sq.ft. Exhibitions are restricted to Associate Members of the International Association on Water Pollution Research.

For further information regarding exhibition space contact

Holzmueller Corporation  
360 Sixth Street, San Francisco, California 94103 (USA)  
Cable address: Waterex, Telex: Telephone (415) 861-2050

### **V<sup>TH</sup> INTERNATIONAL SYMPOSIUM ON CARBOHYDRATE CHEMISTRY**

*Paris, 17-22 August 1970*

The Symposium will be held in Paris from 17th to 22nd August 1970 with the sponsorship of the French Biochemical Society and IUPAC.

#### *Organizing Committee*

President: J.-E. COURTOIS. General Secretary: L. MESTER. Secretary: F. PERCHERON. Treasurer: Mlle G. SPIK. Members: Mlle A. M. STAUB, Mrs S. DAVID, R. DEDONDER, J. MONTREUIL and C. PEAUD-LENOËL.

### *General Informations*

The Symposium is open to all persons interested in the Chemistry and in the Biochemistry of Carbohydrates. Registration forms are available from the permanent secretary of the Symposium, 4, avenue de l'Observatoire, 75-Paris-VI<sup>e</sup>.

A detailed program will be distributed later to the registered Members.

The registration fees are 40 US\$ before 1 June 1970, and 50 US\$ after this date, payable to the Treasurer, Mlle G. SPIK: *Postal cash account*: 77 La Source 30.361.38, V<sup>e</sup> Symposium Inter.Chimie Glucides. 232, Bois d'Epinais, 62-Libercourt (France).

Or: *Bank account*: Société Générale, 51, rue Nationale, 59-Lille, n<sup>o</sup> 5.068.860.

### *General program*

The scientific meetings will be held in the Faculty of Pharmacy, 4, avenue de l'Observatoire, 75-Paris-VI<sup>e</sup> (near the Jardin du Luxembourg) from Monday, 17 August to Saturday, 22 August 1970.

The program will include:

- main lectures (40 minutes followed by 15 minutes of discussion)
- lectures (20 minutes followed by 10 minutes of discussion)
- round-table discussions in the afternoon

Main lectures and lectures are only by invitation.

There will be no free communications, but participation in the round-table discussions will be welcomed.

A morning tour will be organized on Wednesday, 19 August, to the region south of Paris. It will be followed in the afternoon by a special session in the Institut de Chimie des Substances naturelles at Gif-sur-Yvette, in commemoration of Professor M. L. WOLFROM.

After a visit of the laboratories, a reception will be given in the "Château de Gif" (Centre National de la Recherche scientifique) to celebrate the 70th birthday of Professor F. MICHEEL.

The abstracts of the lectures will be distributed to the Members at the registration office and the main lectures will be published in *Pure and Applied Chemistry*.

Thos. Cook and Son will deal with all problems concerning travel and accommodation.

A limited number of rooms will be available in the Cité Universitaire of Paris, 10 minutes by Metro from the lecture halls.

## **IUPAC—INTERNATIONAL SYMPOSIUM ON MACRO- MOLECULES**

*Leiden (The Netherlands), 31 August–4 September 1970*

The Organizing Committee cordially invites scientists to participate in the International Symposium on Macromolecules, 31 August–4 September 1970, at the University of Leiden (The Netherlands).

This Symposium is sponsored by the International Union of Pure and Applied Chemistry and the Royal Dutch Chemical Society.



### *Scientific program*

This Symposium will be devoted to physical and physico-chemical properties of macromolecules and macromolecular systems. It will cover equilibrium and non-equilibrium properties of crystalline and amorphous polymers, polymer mixtures and polymer solutions both from the theoretical and the experimental point of view, as well as the influence of molecular structure on technically interesting properties. In view of the increasing interest of physico-chemists in biopolymers and of biochemists in physico-chemical methods, contributions dealing with the structure and physico-chemical properties of natural and synthetic polyelectrolytes are especially encouraged.

In order to avoid an excessively wide range the Symposium will be limited to physical and physico-chemical properties; papers in which the attention is focused on polymerization reactions and chemical reactions of polymers cannot be accepted.

### *Lectures*

A number of invited speakers will present survey lectures on various topics. These will be published in a special issue of *Pure and Applied Chemistry*.

Participants may submit short contributions for presentation at the Symposium. Abstracts in English of no more than 250 words should be submitted and forwarded to the Secretariat. Authors of accepted papers will be invited to send an extended abstract of no more than 4 typed pages before 1 June 1970.

The extended abstracts will be edited as pre-prints to the Symposium.

### *Secretariat of the Symposium*

Congressbureau Inter Scientias,  
PO Box 9058, The Hague (The Netherlands)  
Telephone: 070-54 38 10, Telex 31700

## **SYMPOSIUM ON CYCLOADDITION REACTIONS**

*Munich (Germany), 7-10 September 1970*

A IUPAC-Symposium on "Cycloaddition Reactions" will take place in Munich, Germany, 7-10 September 1970. The following plenary lecturers have accepted the invitation of the program committee (R. GOMPPER, R. HUISGEN, J. SAUER):

P. D. BARTLETT, Harvard University, Cambridge (USA): "Some borderline cases in cycloaddition"

H. BESTIAN, Farbwerke Hoechst, Frankfurt/M. (Germany): "Cycloadditionen mit Sulfonylisocyanaten"

C. S. FOOTE, University of California, Los Angeles (USA): "Mechanisms of addition of singlet oxygen to olefins and other substrates"

G. M. J. SCHMIDT, Weizman Institute, Rehovoth (Israel): "Photodimerisationen im festen Zustand"

P. S. SKELL, Pennsylvania State University, University Park, Pa. (USA): Topic follows

N. J. TURRO, Columbia University, New York (USA): "Cycloaddition reactions of carbonyl compounds possessing high energy content"



G. WILKE, Max-Planck-Institut für Kohleforschung, Mülheim Ruhr (Germany):  
"Cycloadditionen unter dem Einfluss von Übergangsmetallen"

R. B. WOODWARD, Harvard University, Cambridge (USA): "Orbital symmetry correlations in cycloadditions"

The plenary lectures will be published in *Pure and Applied Chemistry*.

The submission of short (15 minutes) contributions is cordially solicited. Please provide five copies of a short abstract (one typewritten page) with each application. Presentations may be made in English, French, or German.

Those who do not wish to contribute papers are also invited to participate in the Symposium. Please indicate your interest by giving us your address, so that further information can be sent to you: Gesellschaft Deutscher Chemiker, D-6000 Frankfurt am Main 8, Postfach 119075.

## VITH INTERNATIONAL SYMPOSIUM ON MICROTECHNIQUES

Graz (Austria), 7-11 September 1970

The main purpose of this event, organized by the Austrian Society for Microchemistry and Analytical Chemistry and sponsored by IUPAC, will be to allow microchemists to meet in working sessions to exchange ideas and review developments by means of lectures and exhibitions and to honour eminent scientists. The programme will consist of the following principal themes:

- (a) Organic microanalysis
- (b) Inorganic microanalysis
- (c) Micromethods in biochemistry
- (d) Radiochemical micromethods
- (e) Research and teaching in microchemistry
- (f) Exhibition of microchemical equipment and literature
- (g) Demonstrations and "workshop"

These themes will be dealt with in plenary lectures, by discussion panels and in original papers. The plenary lectures will be published in *Pure and Applied Chemistry*.

In addition, contributions may be submitted to the panel discussions which will be on

D.I Physico-chemical methods in PREG-L-procedures

D.II Microanalysis with electron beams

For further details contact: Prof. G. KAINZ, c/o Intercongress Reisedienst und Betreuungs-GmbH, Stadiongasse 6-8, A-1010 Wien (Austria).

# **IAGC SYMPOSIUM ON HYDROGEOCHEMISTRY AND BIOGEOCHEMISTRY**

*Tokyo (Japan), 7–12 September 1970*

The IAGC Symposium on Hydrogeochemistry and Biogeochemistry will be held in Tokyo (Japan), in the period Monday 7 September to Saturday 12 September 1970. Japan Science Council will be the host institution for this symposium. Prof. YASUO MIYAKE of Meteorological Research Institute, Koenji-Kita 4-35, Suginami, Tokyo, has kindly agreed to supervise local arrangements.

## **Tentative Program**

### *Hydrogeochemistry*

- Water in relation to the earth's evolution
- Genesis and nature of thermal water and hydrothermal processes
- Radiochemical problems in the hydrosphere including geochronology
- Oxidation-reduction and precipitation reactions, properties of authigenic minerals and sedimentation processes in water environment
- Air-water interaction
- Hydrochemistry in polar regions

### *Biogeochemistry*

- Nitrogen and carbon cycles
- Origin of life, paleobiogeochemistry
- Biogeochemical aspects of natural gas, petroleum, coal and biogenic minerals
- Biogeochemical effects of human activities
- Biogeochemistry of soils
- Biogeochemistry in the hydrosphere

A Seminar on Isotope Geochemistry will be held following or prior to the symposium for two days. The program for the seminar will include both invited and contributed papers.

Prior to the Tokyo Symposium, the 7th General Meeting of International Mineralogical Association and the 3rd General Assembly of International Association on the Genesis of Ore Deposits will be held jointly in Tokyo and Kyoto, 24 August to 6 September. In addition, following the IAGC Symposium, the 15th General Assembly of International Association for Physical Sciences of the Ocean, IUGG and the 10th General Meeting of Scientific Committee on Oceanic Research, ICSU, will be held in Tokyo, 14–24 September. One and a half day joint symposium by IAGC and IAPSO will be scheduled from the afternoon 14 to 15 September.

Further information may be obtained from: Dr K. SUGAWARA, Sagami Chemical Research Center, 3100 Onuma, Sagamihara-Shi, Kanagawa Prefecture (Japan).

## **SYMPOSIUM ON RECENT ADVANCES IN THE FORMULATION AND PERFORMANCE OF POLYMERIC COMPOSITES**

*Montreal, Quebec (Canada), 9-10 September 1970*

A Symposium on "Recent Advances in the Formulation and Performance of Polymeric Composites", sponsored by the Macromolecular Sciences Division, The Chemical Institute of Canada, will be held 9-10 September 1970 on the campus of McGill University, Montreal, Quebec.

Invited state-of-the-science lectures will cover diverse aspects of interest to polymer physicists, plastics engineers, specialists in reinforced thermoplastics, elastomers and protective coatings.

Leading authorities appearing on the program include: E. B. BAGLEY (Washington U., St. Louis); A. T. DI BENEDETTO (Washington U., St. Louis); F. R. EIRICH (Brooklyn Polytech, Brooklyn); J. C. HALPIN (USAF Materials Lab., Dayton); B. E. M. VAN DER HOFF (U. of Waterloo); SEYMOUR NEWMAN (Ford Motor Company, Dearborn); L. E. NIELSEN (Monsanto, St. Louis); L. E. ST. PIERRE (McGill U., Montreal); and R. WOODHAMS (U. of Toronto, Toronto).

For more information, including preregistration forms, contact A. M. EISENBERG or H. P. SCHREIBER, Department of Chemistry, McGill University, Montreal, Quebec, Canada.

## **RÉUNION EUROPÉENNE DE CHIMIE THÉRAPEUTIQUE**

*Bruxelles (Belgique), 14-17 septembre 1970*

Organisées conjointement par la Société chimique de Belgique et la Société française de Chimie thérapeutique à l'Université Libre de Bruxelles 48-50, avenue Franklin Roosevelt, Bruxelles, avec le concours de: Deutsche Pharmazeutische Gesellschaft, Koninklijke Nederlandse Chemische Vereniging, Società italiana di Scienze farmaceutiche, Society for Drug Research, Vlaamse Chemische Vereniging et l'aide de la Fédération des industries chimiques de Belgique.

*Secrétariat général: 49, square Marie-Louise, 1040 Bruxelles (Belgique).*

## **XIII<sup>TH</sup> INTERNATIONAL CONFERENCE ON COORDINATION CHEMISTRY**

*Kraków-Zakopane (Poland), 14-22 September 1970*

The Polish Academy of Sciences is sending you this invitation to the XIIIth International Conference on coordination chemistry, which will be held in Kraków and Zakopane (Poland), 14-22 September 1970 under the sponsorship of IUPAC.

### *Scientific programme*

Papers will be presented under the following headings:

- Theory of Bonding in Coordination Compounds
- Spectroscopy of Coordination Compounds
- Molecular and Electronic Structure of Lanthanide and Actinide Compounds
- Crystal Structures of Coordination Compounds
- Biological and Catalytical Aspects of Coordination Compounds
- Coordination Compounds with  $\pi$ -Bonding and Metalo-organic Compounds
- New Aspects of Synthesis and Stereochemistry of Coordination Compounds
- Structure and Thermodynamic of Coordination Compounds in Solutions
- Mechanism and Kinetic of Chemical Reaction in Coordination Compounds

The formal opening of the Conference and all plenary lectures will take place in Kraków. All section proceedings will be held in Zakopane.

### *Plenary lectures*

There will be 14 plenary lectures, which will be published in *Pure and Applied Chemistry*.

### *Conference languages*

Papers may be presented in any congress language (English, Russian, French, German). We hope, however, that speakers will prefer English which will be the official language of the Conference. No arrangements will be made for simultaneous translation. Abstracts of papers and all other literature of the Conference will be published in English.

### *Scientific contribution*

Those wishing to contribute papers, are requested to return a "Preliminary Application Form" with a corresponding note. The exact title and abstract will be required on the final application form.

### *Social and tourist programme*

The programme will include receptions, cocktails, ICCO banquet and other social meetings. The place of the Conference is rather attractive, since Kraków, former Capital of Poland, is one of the best known cities in European history. The beautiful Gothic and Romanesque churches, the ancient castle of Wawel, one of the oldest Universities in Europe and genuine mediaeval old town—all give a unique character to programmes which are held in this city.

The other part of Conference will be organized at Zakopane in the Tatra Mountains. Zakopane is a famous tourist centre and a well-known place for summer holidays.

The Tatra Mountains region is one of the few in Europe where very characteristic folk art has been preserved. This is a dominating accent of Zakopane and its environment, and it appears everywhere in the architecture, dress, music, dance and furniture.

Excursion will be arranged to the spectacular parts of the Tatra Mountains. There will also be a presentation of folk-dances, and excursions to the Museums of Folk Art. A special programme will be provided for accompanying participants.



### *Travel*

There are international air connections to Warsaw. From Warsaw to Kraków there are several convenient connections daily by the Polish Airlines "LOT". There are also connections by train and by bus.

### *Registration and correspondence*

All correspondence should be addressed to:

Organizing Committee of XIIIth ICCW  
University of Wrocław, Pl. Uniwersytecki 1, Wrocław (Poland)

## **INTERNATIONAL CONGRESS ON INDUSTRIAL WASTE WATER**

*Stockholm (Sweden), 2-6 November 1970*

Organized by the Federation of Swedish Industries and by IUPAC.

Many international congresses, conferences and symposia dealing with various aspects of water pollution take place every year. The great majority of those only partly deal with industrial problems and seldom touch upon what can be achieved to decrease the polluting effects of industrial wastes by measures that can be integrated into the industrial processes producing them.

The International Congress on Industrial Waste Water will deal exclusively with the potentiality of decreasing water pollution from industrial wastes by measures within the framework of the production processes and by waste water treatment before the waste water reaches the receiving rivers, streams, etc. The International Congress on Industrial Waste Water appeals in particular to managers, administrators, technicians and other persons in industry who, in their work, have to consider industrial waste water problems.

The programme has been designed to cover the majority of those industries which produce large quantities of waste water or which have waste water problems which are especially difficult to manage. Each group of industries will be treated separately by an outstanding expert as the principal lecturer. In addition, a selection of papers contributed by those participating in the Congress will be presented and discussed.

In order to evaluate waste water problems in industry and to make correct decisions on treatment and disposal, one needs factual information about the polluted flows within a plant; therefore one full day of the Congress will be devoted to measurement of flow and sampling in this respect.

### **Programme**

Monday, 2 November: Economics of water pollution abatement in industry.

Tuesday, 3 November: Techniques and methods for measurement of flows and sampling in polluted flows within plants.

Wednesday, 4–Friday, 6 November: Measures taken against water pollution in industry. Internal measures within production processes and external treatment of waste water.

This theme will be treated simultaneously in five sections, with sessions and discussions on the following subjects:

(1) *Chemical industries*

Petroleum refineries and petroleum cracking plants.—Production of petrochemicals, including polymers.—Production of basic inorganic chemicals including fertilizers.—Production of organic chemicals, from sources other than petroleum.

(2) *Food industries*

Dairies and milk processing industries.—Beet sugar processing industries.—Abattoirs and meat preparation, preserving and canning industries.—Starch and potato processing industries.—Fruit and vegetable preserving and canning industries.—Industries producing edible oils and fats.

(3) *Metal industries*

Basic iron and steel industries.—Engineering industries which employ cutting, drilling and similar processes.—Industries which perform metal finishing.—Basic non-ferrous metal industries.

(4) *Pulp and paper industries*

Kraft or sulphate pulp and paper mills.—Sulphite pulp and paper mills.—Mechanical pulp and paper mills.—Wallboard mills.

(5) *Miscellaneous industries*

Coal mining.—Salt and potash mining.—Metal mining.—Textile industries (production of cotton, wool and synthetic fibres and fabrics).—Tanneries and leather finishing.—Fermentation industries.

*Congress language*

The main lectures and all congress literature will be given in English. Simultaneous translation will not be arranged. The main lectures will subsequently be published in *Pure and Applied Chemistry*.

*Contributed papers*

Those attending the Congress are invited to submit special reports dealing with matters within the framework of the programme.

*Accommodation*

Hotel reservations can be made through an agency attached to the Congress secretariate.

*Ladies programme*

A ladies programme will be arranged.

### *Registration fee*

Registration fee, including the congress publication, all other congress literature and some social events as well, will be approximately as follows:

- First attendee from a company or similar organization or body 100 US\$
- Further attendees from the same organization 70 US\$/person
- Attendees, including the first, from companies which are associate members of IUPAC 70 US\$/person

For further information please contact:

International Congress on Industrial Waste Water  
Drottning Kristinas väg 47 D  
S-114 28 Stockholm (Sweden)

## **XXIII<sup>RD</sup> INTERNATIONAL CONGRESS OF PURE AND APPLIED CHEMISTRY**

*Boston, Massachusetts (USA), 25–31 July 1971*

The National Academy of Sciences—National Research Council of the United States of America—extends a cordial invitation to participate in the XXIII<sup>rd</sup> International Congress of Pure and Applied Chemistry, under the sponsorship of the International Union of Pure and Applied Chemistry, to be held in Boston (Massachusetts), 25–31 July 1971.

### *Organizing Committee*

*Chairman:* CRAWFORD H. GREENEWALT, E.I. du Pont de Nemours & Co., Inc.,  
Wilmington, Delaware

*Vice-Chairman:* RALPH CONNOR, Rohm & Haas Co., Philadelphia, Pennsylvania

*Executive Secretary:* MARTIN A. PAUL, National Academy of Sciences—National  
Research Council, Washington, DC

*Program:* PAUL D. BARTLETT, Harvard University, Cambridge, Massachusetts

*Organic:* BLAINE C. MCKUSICK, E.I. du Pont de Nemours & Company, Inc.,  
Wilmington, Delaware

*Macromolecules:* PAUL J. FLORY, Stanford University, Stanford, California

*Finance:* KENNETH H. HANNAN, Union Carbide Corporation, New York City, New  
York

*Hospitality:* LOUIS W. CABOT, Cabot Corporation, Boston, Massachusetts

*Local Arrangements and Secretariat Director:* A.T. WINSTEAD, American Chemical  
Society, Washington, DC

*Public Information:* B.R. STANERSON, American Chemical Society, Washington, DC

*Travel Awards:* CHARLES G. OVERBERGER, The University of Michigan, Ann Arbor,  
Michigan

### **Scientific program**

A distinguished scientific program will encompass the interests of two Divisions of the International Union of Pure and Applied Chemistry: *Organic Chemistry* and *Macromolecules*.

### *Organic Chemistry*

Symposia are planned on the following topics:

- (1) Applications of theory and quantum mechanics, L.SALEM (Chairman), Faculty of Science, Orsay (France)
- (2) Spectroscopy in structure determination, K.NAKANISHI (Chairman), Columbia University, New York (USA)
- (3) General methods of synthesis. P.YATES (Chairman), University of Toronto (Canada)
- (4) New natural product syntheses, M.M.SHEMYAKIN (Chairman), Institute for the Chemistry of Natural Products, Academy of Sciences, Moscow (USSR)
- (5) Intramolecular rearrangements and valence isomerization, J.BERSON (Chairman), Yale University, New Haven (USA)
- (6) Small rings, E.SCHMITZ (Chairman), Academy of Sciences, Berlin-Adlershof (East Germany)
- (7) Organo-transition metal chemistry, Sir RONALD NYHOLM (Chairman), University College, London (UK)
- (8) Short-lived intermediates: carbenoids, singlet oxygen, arynes, carbynes, P.SKELL (Chairman), Pennsylvania State University (USA)
- (9) Free radicals and homolytic mechanisms, M.JULIA (Chairman), University of Paris (France)
- (10) Photochemistry, E.HAVINGA (Chairman), Leiden University (Netherlands)
- (11) Medicinal chemistry, B.M.BLOOM (Chairman), Chas.Pfizer & Co., Groton (USA)

### *Macromolecules*

Symposia will be held on timely topics to be selected from principal areas such as the following:

- A Biopolymers and synthetic models for biopolymers, including oligomeric analogs
- B Synthetic polymer chemistry, with emphasis on polymerization mechanisms and on new synthetic methods
- C New applications of polymers
- D Advances in polymer technology
- E Structure, conformation, and stereochemistry of polymer chains
- F Dynamic and thermodynamic properties of polymers and their solutions
- G Chemical reactions of macromolecules, including mechanisms of enzyme action

### *Joint Symposia*

In addition to the foregoing, joint symposia are planned on the following topics:

- (1) Homogeneous catalysis, G.WILKE (Chairman), Max-Planck-Institut für Kohlenforschung, Mühlheim/Ruhr (Germany)
- (2) Biocatalysis, D.E.KOSHLAND (Chairman), University of California at Berkeley (USA)



- (3) Synthesis of biopolymers and biooligomers
- (4) Advances in conformational analysis
- (5) Ion-pair processes, M. SZWARC (Chairman), State University College of Forestry at Syracuse (USA)

### **Correspondence**

All correspondence concerning the Congress should be addressed to:

Secretariat: XXIIIrd Congress of Pure and Applied Chemistry, A.T. WINSTEAD, Director, c/o American Chemical Society, 1155 Sixteenth Street, N.W. Washington, DC 20036 (USA)

Cable Address: AmChemSo, Washington, DC

### **VTH INTERNATIONAL MATERIALS SYMPOSIUM**

*University of Berkeley, California (USA), 13-17 September 1971*

The Inorganic Materials Research Division of the Lawrence Radiation Laboratory, University of California at Berkeley, in cooperation with the College of Engineering announces the Fifth International Materials Symposium to be held 13-17 September 1971 at the University in Berkeley. The subject of the Symposium will be: "The structure and properties of materials—Techniques and applications of high resolution microscopy." The Co-chairmen of this conference will be Profs G. THOMAS and R. FULRATH of the Department of Materials Science and Engineering, University of California, Berkeley, and Dr R. M. FISHER of the Edgar C. Bain Laboratory of the United States Steel Corporation, Monroeville, Pa. (USA).

If there appears to be a conflict in schedule with meetings of similar interest to be held by other organizations whose members may also want to attend ours as well, please notify us at your earliest opportunity so that we may consider rescheduling the date of the Symposium. After the dates are definitely selected, we would appreciate having the Symposium entered on your Events Calendar. Additional information on the subject of material and speakers will be sent to you when the Advance Program has been determined.

The goal of this continuing series of international meetings is to provide an outstanding scientific forum for the presentation, discussion and publication of important research problems by leading workers in the field and thus further the progress of the science of metallic and nonmetallic materials.

The Inorganic Materials Research Division, headed by Prof. LEO BREWER, is financially supported as a fundamental research organization of the US Atomic Energy Commission but operates as an interdisciplinary research laboratory for portions of the faculties of several University academic departments.

Further information may be obtained from the Arrangements Chairman: C. V. PATERSON, Inorganic Materials Research Division, University of California, Berkeley, California 94720.

## IUPAC-SPONSORED MEETINGS

1970

April 1-4	International Conference on Thermodynamics (Dr D. T. MORGAN, Secretary of Organizing Committee, International Conference on Thermodynamics, University College of South Wales, Cardiff CFI 3NR, UK)	Cardiff (UK)
June 21-27	VIIth International Symposium on the Chemistry of Natural Products (Prof. S. N. ANANCHENKO, General Secretary, VIIth International Symposium on the Chemistry of Natural Products, Institute for Chemistry of Natural Products, Academy of Sciences of USSR, ul. Vavilova 18, Moscow V-312, USSR)	Riga (USSR)
July 8-10	Symposium on Non-aqueous Electrochemistry: Organic and Inorganic Solvents including Fused Salts (Dr J. BADOZ-LAMBLING, Laboratoire de Chimie analytique, Ecole supérieure de Physique et de Chimie industrielles, 10, rue Vauquelin, F-75 Paris 5 <sup>e</sup> , France)	Paris (France)
July 12-18	IIIrd International Symposium on Photochemistry (Prof. D. BRYCE-SMITH, Chairman of Organizing Committee, IIIrd IUPAC Symposium on Photochemistry, Department of Chemistry, University of Reading, Whiteknights Park, Reading, Berkshire, UK)	St. Moritz (Switzerland)
August 17-22	Vth International Symposium on Carbohydrate Chemistry (Dr L. MESTER, General Secretary, Vth International Symposium on Carbohydrate Chemistry, Institut de Chimie des Substances naturelles, F-91 Gif-sur-Yvette, France)	Paris (France)
August 24-28	International Symposium on the Chemistry of Nonbenzenoid Aromatic Compounds (Prof. S. ITO, General Secretary, International Symposium on the Chemistry of Nonbenzenoid Aromatic Compounds, Department of Chemistry, Tohoku University, Sendai, Japan)	Sendai (Japan)
August 24-29	IIIrd Analytical Conference (IIIrd Analytical Conference, Hungarian Chemical Society, Budapest V, Szabadság tér 17, Hungary)	Budapest (Hungary)
August 31- September 4	International Symposium on Macromolecules: Physical Chemistry and Physics of Synthetic Polymers, Natural Polymers and Biopolymers (Congressbureau Inter Scientias, PO Box 9058, The Hague, Netherlands)	Leiden (Netherlands)
September 7-10	IUPAC Symposium on Cycloaddition Reactions (Gesellschaft deutscher Chemiker, PO Box 119 075, D-6 Frankfurt, Germany)	Munich (Germany)
September 7-11	VIth International Symposium on Microtechniques (Sekretariat des VI. Internationalen Symposiums für Mikrochemie, c/o INTERCONGRESS, Stadiongasse 6-8, A-1010 Wien, Austria)	Graz (Austria)
September 7-12	Symposium on Models of Biopolymer Structure and Functions (Dr B. SEDLÁČEK, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Prague 6 - Petřín, Czechoslovakia)	Carlsbad (Czechoslovakia)
September 8-11	International Symposium on Chemistry of Pesticides under Metabolic and Environmental Conditions (Sekretariat Symposium 1970, Institut für ökologische Chemie, 5201 Schloss Birlinghoven, Germany)	Bonn/ Birlinghoven (Germany)
September 14-18	IInd International Symposium on Organic Solid-State Chemistry (Prof. M. D. COHEN, Secretary of Organizing Committee, IInd International Symposium on Organic Solid-State Chemistry, Department of Chemistry, Weizmann Institute of Science, Rehovot, Israel)	Rehovot (Israel)

September 14–22	XIIIth International Conference on Co-ordination Chemistry (Dr K. BUKIETYŃSKA, Secretary, XIIIth International Conference on Co-ordination Chemistry, Uniwersytet Wrocławski, Katedra Chemii Nieorganicznej, Wrocław, Poland)	Zakopane/ Kraków (Poland)
November 2–6	International Congress on Industrial Waste Water (International Congress on Industrial Waste Water, Drottning Kristinas väg 47 D, S-11428 Stockholm, Sweden)	Stockholm (Sweden)
1971		
February 17–19	Symposium on Pesticide Terminal Residues (The Organizing Committee, IInd International Congress of Pesticide Chemistry, PO Box 16271, Tel Aviv, Israel)	Tel Aviv (Israel)
February 21–26	IInd International Congress of Pesticide Chemistry (The Organizing Committee, IInd International Congress of Pesticide Chemistry, PO Box 16271, Tel Aviv, Israel)	Tel Aviv (Israel)
July 5–9	IIIrd International Congress on Crystal Growth (Dr B. MUTAF-TSHIEV, Secrétaire général de ICCG-3, Laboratoire des Mécanismes de la Croissance cristalline, Faculté des Sciences de Marseille, Saint-Jérôme, F-13 Marseille 13 <sup>e</sup> , France)	Marseille (France)
July 12–14	IInd Intern. Calorimetry Conference (Prof. C. E. VANDERZEE, Department of Chemistry, University of Nebraska, Lincoln, Nebraska, USA)	Orono, Maine (USA)
July 12–16	IIIrd Society for Analytical Chemistry Conference (Mr C. A. JOHNSON, Secretary of Organizing Committee, IIIrd SAC Conference, Society for Analytical Chemistry, 9/10 Savile Row, London W1X 1AF, UK)	Durham (UK)
July 15–24	XXVIth International Conference of Pure and Applied Chemistry (Executive Secretary, IUPAC Secretariat, Bank Court Chambers, 2/3 Pound Way, Cowley Centre, Oxford OX4 3YF, UK)	Washington, DC (USA)
July 26–31	XXIIIrd International Congress of Pure and Applied Chemistry (Mr. A. T. WINSTEAD, American Chemical Society, 1155 Sixteenth Street NW, Washington, DC 20036, USA)	Boston (USA)
August 16–22	Vth International Conference on Organometallic Chemistry (Dr S. P. GUBIN, Secretary of Organizing Committee, Vth International Conference on Organometallic Chemistry, Institute of Organometallic Compounds, Academy of Sciences of USSR, Ul. Vavilova 28, Moscow V-312, USSR)	Moscow (USSR)
September	International Symposium on Chemical Education (Prof. E. GIESBRECHT, Departamento de Química-USP, Caixa Postal 8105, São Paulo, Brazil)	São Paulo (Brazil)
1972		
April 3–7	International Congress on Analytical Chemistry (Prof. T. FUJINAGA, Faculty of Sciences, University of Kyoto, Kyoto, Japan)	Kyoto (Japan)
June 4–7	IIIrd International Symposium on Carotenoids other than Vitamin A (Prof. C. BODEA, Chairman of Organizing Committee, IIIrd International Symposium on Carotenoids, Ministerul Învăţămîntului, Institutul Agronomic «Dr Petru Groza», Strada Mănăştur 3, Cluj, Romania)	Cluj (Romania)
August	Vth International Congress on Catalysis (Prof. R. L. BURWELL, Jr, Department of Chemistry, Northwestern University, Evanston, Illinois 60201, USA)	(USA)



## CALENDAR OF NON-IUPAC MEETINGS

1970

April 6-7	IInd General Assembly, European Association of Editors of Biological Periodicals (Dr J. BURES, Institut of Physiology, Czechoslovak Academy of Sciences, Budejovická 1083, Praha 4)	London (UK)
April 20	XXI <sup>e</sup> Congrès «Journées de la Chimie 1970» (Dr L. SATTÀ, Sezione Lombarda, Società chimica italiana, Piazzale Rodolfo Morandi 2, I-20121 Milano, Italy)	Milano (Italy)
April 27-30	IIIrd European Symposium on Use of Computers in Chemical Engineering (Dr Ing. A. CAPPELLI; Dr L. SATTÀ, Sezione Lombarda, Società chimica italiana, Piazzale Rodolfo Morandi 2, I-20121 Milano, Italy)	Firenze (Italy)
April 29- May 2	Vortragstagung über «Biochemische Analytik» (Gesellschaft für biologische Chemie usw.)	Munich (Germany)
May 3-7	I. Internationale Konferenz über statische Elektrizität (Dipl.-Ing. E. CZEJKA, BVFA-Arsenal, Objekt 221, A-1031 Wien III, Austria)	Wien (Austria)
May 19-21	Assemblée générale annuelle de la Société chimique de France (Secrétariat: 250, rue Saint-Jacques, F-75 Paris 5 <sup>e</sup> )	Rouen (France)
Beginning June	Dänisch-deutsche Lebensmittelchemikertagung (Gesellschaft deutscher Chemiker, D-6 Frankfurt, Germany, PO Box 119075)	Copenhagen (Denmark)
June 8-10	Ist International Symposium on Chemical Reaction Engineering (American Chemical Society, 1155 16th Street NW, Washington DC 236, USA)	Washington (USA)
June 17-19	International Symposium on Gustation and Olfaction. President: Prof. O. REVERDIN, Geneva (Secretary: POB 124, CH-1211 Geneva 8, Switzerland)	Geneva (Switzerland)
June 17-24	ACHEMA 70 (DECHEMA, PO Box 970147, D-6 Frankfurt, Germany)	Frankfurt (Germany)
June 17-24	Europäisches Treffen für Chemische Technik 1970 (DECHEMA, Postfach 970146, D-6000 Frankfurt/Main 97, Germany)	Frankfurt/Main (Germany)
June 23-26	IIIrd Wood Chemistry Symposium (Chemical Institute of Canada, 151 Slater Street, Ottawa 4, Ontario, Canada)	Vancouver (Canada)
July 6-10	EUCHEM Conference: Principles of Heterocyclic Synthesis (Dr R. S. McELHINNEY, Conference Secretary, Medical Research Council Laboratories, Trinity College, Dublin 2, Ireland)	Co. Kildare (Ireland)
July 26- August 1	Vth International Conference on Water Pollution Research (California Host Committee, Room 114, McLaughlin Hall, University of California, Berkeley, California 94720, USA), and	San Francisco (USA)
August 2-5	Reconvened Session on Water Pollution	Honolulu (Hawaii)
September 1-4	IInd National Conference of Pure and Applied Physical Chemistry (Prof. V. EM. SAHINI, Institute of Physical Chemistry, C. P. 2103, București 13, Romania)	Bucharest (Romania)
September 7-12	Meeting on Activation Analysis in Geochemistry and Cosmochemistry (Secretary: E. ANDERSEN, Reactor School, Institutt for Atomenergi, N-2007 Kjeller, Norway)	Kjeller/Oslo (Norway)
September 7-12	IAGC Symposium on Hydrogeochemistry and Biogeochemistry (Dr K. SUGAWARA, Sagami Chemical Research Center, 3100 Onuma, Sagamihara-Shi, Kanagawa Prefecture, Japan)	Tokyo (Japan)
September 14-16	IIIrd International Symposium on Fresh Water from the Sea (Working Party on Fresh Water from the Sea, PO Box 1199, Omoioia, Athens, Greece)	Dubrovnik (Yugoslavia)



October 6	Chemietag der Gesellschaft deutscher Chemiker (Gesellschaft deutscher Chemiker, PO Box 119075, D-6 Frankfurt, Germany)	Düsseldorf (Germany)
October 13-15	Jahrestreffen 1970 der Verfahrens-Ingenieure (Verfahrenstechnische Gesellschaft im VDI, Postfach 1139, D-4000 Düsseldorf 1, Germany)	Munich (Germany)
October 25-31	EUCHEM-Konferenz: Primärprozesse organischer Verbindungen in kondensierten Phasen	Schloss Elmau (Germany)
November 16-19	Tagung: «Datenverarbeitung in der analytischen Chemie» und: «Fortschritte in der instrumentellen Analyse» (Gesellschaft deutscher Chemiker, PO Box 119075, D-6 Frankfurt, Germany)	Basle (Switzerland)

### LAST MINUTE INFORMATION

1970

May 3-9	Bürgenstock Meeting on Stereochemistry (Prof. HAVINGA, Chairman)	Bürgenstock (Switzerland)
June 22	Chemistry Day GDCH on the occasion of theACHEMA	Frankfurt (Germany)
September 3-9	VIIIth International Congress of Biochemistry. Organized as an integrated series of 10 symposia (A. E. RENOLD, Chairman, Geneva, POB 97, CH-1820 Montreux, Switzerland)	Interlaken, Lucerne, Montreux (Switzerland)
September 14-17	VI <sup>e</sup> Réunion européenne de Chimie thérapeutique (Société chimique de Belgique, 49, square Marie-Louise, B-1040 Bruxelles, Belgique)	Brussels (Belgium)
September 21-25	International Health Conference	Edinburgh (Scotland)
October 13-15	Conference on Petrochemicals and their Raw Materials in Europe, at the Duna Intercontinental Hotel (POB 121, Budapest 5, Hungary)	Budapest (Hungary)

## LIST OF ABBREVIATIONS

AOAC	Association of Official Agricultural Chemists
CBN	Commission on Biochemical Nomenclature
CEBJ	Commission of Editors of Biochemical Journals
CEE	Communauté Economique Européenne
CIG	Comité International de Géophysique
CIPM	Comité International de Poids et Mesures
CITCE	Comité International de Thermodynamique et Cinétique Electrochimique
CNRS	Centre national de la Recherche scientifique
COMECON	Council for Mutual Economic Assistance
COSPAR	Committee on Space Research
CSF	Compagnie Télégraphie Sans Fil
CSIRO	Commonwealth Scientific and Industrial Research Organization
DECHEMA	Deutsche Gesellschaft für chemisches Apparatewesen eV
EEC	European Economic Community
EMPA	Eidgenössische Materialprüfungs-Anstalt
EPPO	European and Mediterranean Plant Protection Organization
ETH	Eidgenössische Technische Hochschule (Zürich)
EUCEPA	European Committee on Cellulose and Paper
EUROTOX	Comité européen permanent pour la Protection des populations contre les risques de toxicité à long terme
FAGS	Federation of Astronomical and Geophysical Services
FAO	Food and Agriculture Organization
GEFAP	Groupeement européen des Associations nationales de Fabricants de Pesticides
IAEA	International Atomic Energy Agency
IAMS	International Association of Microbiological Societies
IAPT	International Association for Plant Taxonomy
IASH	International Association of Scientific Hydrology
IAU	International Astronomical Union
IBP	International Biological Programme
ICCA	International Commission for Cellulose Analysis
ICSU	International Council of Scientific Unions
ICUMSA	International Committee for the Unification of Methods of Sugar Analysis
IGU	International Geographical Union
IMU	International Mathematical Union
ISO	International Organization for Standardization
ITU	International Telecommunication Union
IUB	International Union of Biochemistry
IUBS	International Union of Biological Sciences
IUCr	International Union of Crystallography
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
IUNS	International Union of Nutritional Sciences
IUPAC	International Union of Pure and Applied Chemistry
IUPAP	International Union of Pure and Applied Physics

JCAM	Joint Commission on Atomic Masses
JCAR	Joint Commission on Applied Radioactivity
MIT	Massachusetts Institute of Technology
NAS	National Academy of Sciences
NATO	North Atlantic Treaty Organization
NBS	National Bureau of Standards
NRC	National Research Council
OECD	Organisation de Coopération et de Développement économiques
OEPP	Organisation européenne de Protection des Plantes
OMS	Organisation Mondiale de la Santé
SCAR	Scientific Committee on Antarctic Research
SCOR	Scientific Committee on Oceanic Research
UICC	Union internationale contre le Cancer
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHO	World Health Organization
WMO	World Meteorological Organization

## COMPTES RENDUS XXV<sup>TH</sup> CONFERENCE

*Cortina d'Ampezzo, 30 June–8 July 1969*

This publication (330 pp.) contains reports of the deliberations of the XXVth IUPAC Conference, including the XXVth IUPAC Council Meeting and some 34 other IUPAC Units. Many important international programmes of work currently being undertaken by IUPAC—Atomic Weights 1969; Terminal Pesticide Residues and Pesticide Residue Analysis—are described in detail. Current membership lists of all IUPAC Units are provided.

The Comptes Rendus is available from the IUPAC Secretariat. Price \$5 (£2).

## EVALUATION IN CHEMISTRY

*Report on International Workshop: Ceylon 1968 (IUPAC/UNESCO)*

This report is a guide to all those who are concerned with the design, administration and execution of examinations in chemistry, particularly at the school level. It aims to show by examples how chemistry examinations can have influence on the curriculum in chemistry and how recent trends in chemistry teaching can give rise to new approaches to examinations and new types of questions.

The Workshop, on which the report is based, was under the Chairmanship of Prof. H.F. HALLIWELL of the University of East Anglia and the members included some leading experts on chemistry examinations from the UK, USA, India, Malaysia and Ceylon. The examples are taken from chemistry test items prepared in Ceylon but they have relevance to many other countries in the developed as well as developing world.

The report is available from the IUPAC Secretariat. Price \$1.5 (12s 6d).



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**INTERNATIONAL UNION OF PURE  
AND APPLIED CHEMISTRY**  
**UNION INTERNATIONALE DE CHIMIE  
PURE ET APPLIQUÉE**

**INFORMATION BULLETIN**  
**NUMBER 38**

NOVEMBER 1970

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International Union of Pure and Applied Chemistry  
1970

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### **IUPAC INFORMATION BULLETIN**

The Bulletin, issued three times per annum, provides a news medium for the various activities of IUPAC, especially of topics which need regulation, standardization or codification. It includes details of forthcoming international symposia which are to be sponsored by IUPAC together with reports of some such meetings which have recently taken place.

Commencing Bulletin No. 37 (April 1970), gratis copies will no longer be distributed so widely as in the past. The Bulletin is available at an annual subscription of \$2.5 (£1) from the IUPAC Secretariat.

# COSPAR

## REPORT ON THE THIRTEENTH PLENARY MEETING

*Leningrad, 19–29 May 1970*

### *Preliminary remarks*

COSPAR was founded by the General Assembly of the International Council of Scientific Unions (ICSU) in Washington in 1957. At that time it proved extremely difficult to achieve fruitful cooperation between those countries which were in a position to launch satellites, and IUPAC was able to play a decisive role at that ICSU Meeting in reaching a general agreement and having the COSPAR Charter accepted by the General Assembly.

In the years following the foundation of COSPAR it was not easy to find scientists who were willing to represent IUPAC at the COSPAR Meetings because these meetings were most time-consuming on the one hand and the symposia, on the other hand, were—and still are—of utmost specialization.

The COSPAR Meetings in Leningrad were preceded by a most interesting symposium on solar terrestrial physics. After this symposium—on 20 May 1970—the first preliminary session of the whole COSPAR was opened by President Prof. MAURICE ROY in the sumptuous Tavrishesky Palace. There were some 1200 participants for whom the spacious premises and the huge auditorium provided excellent conditions. The plurality of countries united in COSPAR, and launching or observing satellites, gave their activity reports at this preliminary meeting. Business meetings were held by the Executive Council subsequently. Various meetings were also held by the Working Committees.

It is obvious that the landing of Apollo 12 on the Moon and the exciting venture and manoeuvre of Apollo 13 gave to the XIIIth General Assembly of COSPAR special actuality. Moreover, for the first time an additional nation was able to make exciting reports on its starting to launch rockets itself.

The first Japanese satellite was launched successfully from the Kagoshima Space Center on 11 February 1970. The project was aimed to test the satellite orbiting techniques by the Lambda 4S launch vehicle. Twenty-five rockets including engineering test flights were fired from the Kagoshima Space Center, University of Tokyo. Major accomplishments are summarized in the following items:

- Meteorology and Atmospheric Electricity
- Ionosphere
- Magnetosphere
- Solar Flare
- Solar System Astronomy
- Galactic Radiation

Just after the meeting USSR surprised mankind by placing a spacecraft into orbit for an exceptionally long time and announced that it is for the present not interested in exploring the Moon by manned spacecraft.



## General Organization

On the invitation of the USSR Academy of Sciences, the XIIIth Meeting of COSPAR, including the specialized Symposium on Remote Sounding of the Atmosphere, was held from 20 to 29 May 1970, in Leningrad in the historic premises of the Tavrichesky Palace. The COSPAR Meeting was preceded by the International Symposium on Solar-Terrestrial Physics (STP Symposium) sponsored jointly by IAU, IUGG/IGA, URSI, and COSPAR which took place during the period 12–20 May 1970, also in the Tavrichesky Palace.

### *Meetings of Various COSPAR Bodies*

Bureau	20 and 28 May
Executive Council	21, 27, and 28 May
Plenary	21 and 29 May
Working Groups, their Panels, Panel on Planetary Quarantine, Advisory Committee on Data Problems and Publications	between 22 and 28 May

### *Specialized Symposium*

Symposium on Remote Sounding of the Atmosphere, jointly sponsored by COSPAR, WMO, and IUGG/IAMAP	22, 25, and 26 May
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## Presentation of Papers

During the meeting the following numbers of papers were presented:

<i>Symposium on Remote Sounding of the Atmosphere</i>	36
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### *Open Meetings of WGs and Panels*

– Annual Review Sessions	7
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	<hr/>
	Total: 300
	<hr/>

### **Publication of Proceedings**

The Proceedings of the COSPAR Meeting in Leningrad will be published as follows:

#### *Space Research XI*

including the papers on physical sciences presented at the Open Meetings of COSPAR Working Groups and at the sessions of the Symposium on Remote Sounding of the Atmosphere. The volume will be edited by Prof. K. YA. KONDRATIEV, Dr M.J. RYCROFT, and Prof. C. SAGAN.

#### *Life Sciences and Space Research IX*

comprising the papers presented during the Open Meetings of COSPAR Working Group 5 on Space Biology. The editors will be Prof. W. VISHNIAC and another person to be appointed by the US National Academy of Sciences.

The above two volumes will be published by Akademie-Verlag, Berlin (GDR), the new publisher of COSPAR Proceedings and they will appear before the 1971 Meeting of COSPAR.

### **Activities of COSPAR Working Groups**

In addition to the Open Meetings, the COSPAR Working Groups held numerous Business Meetings at which the plans of future work were outlined and a number of resolutions and recommendations passed. New Working Groups created as a result of reorganization of COSPAR's structure during the 1969 COSPAR Meeting in Prague, formed their membership.

### **Presidency of COSPAR**

Prof. M. ROY, who intended to retire beginning with the 1970 Meeting of COSPAR, has been requested by the Plenary to continue as President until the 1971 COSPAR Meeting.

### **Participation**

The COSPAR Meeting in Leningrad was attended by 940 participants from 31 countries, among them 502 participants from USSR.

### **Location and Scientific Program of next COSPAR Meeting**

The invitation to hold the XIVth Plenary Meeting of COSPAR in Seattle, Washington (USA), during the period 21 June to 2 July 1971, extended by the US National Academy of Sciences, was accepted with gratitude by COSPAR.

The XIVth COSPAR Meeting, in addition to the Business Meetings of various COSPAR bodies, will include:

*Joint Open Meetings of Working Groups devoted to Annual Reviews in Space Research*  
*Open Meetings of Working Groups on Latest Significant Results in Space Research*  
*Specialized Symposia* to be held in conjunction with the XIVth Meeting of COSPAR:

- *Symposium on High Resolution Astronomical Observations from Space*. IAU has been approached for cosponsorship
- *URSI/COSPAR Symposium on the Neutral and Ionized Components of the Atmosphere above 120 km*
- *Symposium on 1970 Solar Eclipse*. IUCSTP is being requested to coordinate the organization in consultation with all interested Unions and COSPAR
- *Symposium on Global Biophysics*. This Symposium will be organized as a joint IUPAB/COSPAR manifestation

Two other proposals on COSPAR's participation in symposia to be held immediately after and immediately before the XIVth Meeting of COSPAR have been also raised. These proposals are being considered with IUCSTP and the decisions in this respect will be made after the IUCSTP opinion is known. The symposia concerned are:

- *Symposium on D- and E-Region Ion Chemistry*, to be organized by the University of Illinois, Urbana, Illinois, USA
- *Symposium on the November 1969 Solar Particle Event*, to be organized by AFCRL, Cambridge, Mass., USA

### **STATEMENT BY SECRETARY GENERAL OF IUPAC**

*on the occasion of the Thirteenth Plenary Meeting of COSPAR*

*Leningrad, 22 May 1970*

To: President of the USSR Academy of Sciences

To: President of COSPAR

Dear Colleagues,

Ten days ago the distinguished President of ICSU, Academician AMBARTSUMIAN, entrusted Dr RUDOLF MORF with the great honour of representing ICSU at the XXIVth General Assembly of the World Health Organization in Geneva.

Neither ICSU nor WHO being officially represented here in Leningrad, and knowing personally Prof. AMBARTSUMIAN (ICSU) as well as Dr CANDAU (WHO), I feel sure that both these important international organizations do not object if, on this occasion, I express in their name—"quasi acting on a mission without being appointed to"—their high appreciation of the good work achieved by COSPAR, and extend to you all their heartiest greetings.

Now, returning to IUPAC, our scientific union, which more than 13 years ago was not only one of the founders of COSPAR, but also one of the leading forces in stimulating close cooperation in space research, it is my great privilege to congratulate COSPAR on its success. All chemists—united in IUPAC—are always willing and ready to lend their competent advice, their constructive and realistic help whenever chemical problems have to be solved in the context of space research. Fact-finding is one of the major concerns of chemistry in a pure and applied form. I am convinced that there will be hardly any topic in space research which does not urgently need consideration by chemists who always have their feet on the ground in order to put scientific information on a realistic basis.

IUPAC will be delighted to cooperate very actively in COSPAR's Working Groups.

Finally it is my pleasant and personal duty—here in Leningrad—to pay tribute to one of my greatest countrymen who was appointed to be one of the founders of the Scientific Academy in this country, the famous mathematician LEONHARD EULER from Basel, Switzerland, a universal scientist and one of the first men doing space research.

In my capacity as Secretary General of the Swiss Academy of Sciences I am pleased to inform you that our special Committee for publication of the scientific work of LEONHARD EULER has published—among more than 80 volumes—a special volume in Latin on the Moon and another work on Mechanics in Space. In very fruitful co-operation with USSR colleagues we are just now engaged in the publication of the copious correspondence of LEONHARD EULER.

Terminating in great indebtedness to this hospitable people and country I am honoured in thanking this Nation for granting eternal peace and rest to my countryman EULER whose tomb is beautifully marked with granite here in Leningrad:

LEONHARD EULER

born Basel April MDCCVII

died Petersburg September MDCCLXXXIII

## **RESOLUTIONS AND RECOMMENDATIONS**

### **Adopted by the XIIIth Plenary Meeting of COSPAR**

*Leningrad, 29 May 1970*

#### *Decision No. 1*

proposed by the Executive Council on the proposal of Working Group 1

COSPAR,

*considering* that a large international group of observers of ionospheric beacon satellites Explorer 22 and 27 have made important contributions to ionospheric studies that should be continued; and

*believing* that, in addition to planned geostationary beacons, only low altitude satellites are adequate for the continuation of many types of observation; again



*invites* those administrations which are planning satellite programs to consider the possibility of putting ionospheric beacons on low-altitude satellites, using harmonic frequencies near 20, 40 and 41 MHz, and possibly 360 MHz. (See Decision 6, COSPAR XII Meeting, Prague 1969.)

#### *Decision No. 2*

proposed by the Executive Council on the proposal of Working Group 1

COSPAR,

*endorses* the International Satellite Geodesy Experiment (ISAGEX) as an appropriate response to Decision No. 2 of COSPAR XII (Prague, 1969) and  
*recognizes* the high scientific interest of its program,  
*urges* participating stations to acquire a significant number of well distributed observations.

Furthermore, COSPAR

*realizing* the importance of daytime laser ranging, and the corresponding need for precise and prompt predictions,  
*requests* that a sufficient number of well distributed stations be ready to provide the prediction centers with observations having a precision of 1 minute of arc and 0.05 second in time within two days after their acquisition.

#### *Decision No. 3*

proposed by the Executive Council on the proposal of Working Group 1

COSPAR,

*noting* that UK intends to launch during 1970 a gold-plated spherical satellite 0.76 metre in diameter for accurate measurements of the variations in upper-atmosphere density at heights near 350 km by orbital analysis,  
*recognizes* that the value of this experiment will be greatly enhanced if world-wide tracking is undertaken, and  
*recommends* that all National Institutions and other agencies take steps to secure the cooperation of all stations capable of tracking this satellite in making such observations.

#### *Decision No. 4*

proposed by the Executive Council on the proposal of Working Group 1

COSPAR,

*recognizing* the scientific significance of precise laser tracking of satellites, and  
*noting* the increasing number of laser-equipped stations in many countries,  
*urges* space agencies launching satellites to equip suitable future satellites with retro-reflectors.

#### *Decision No. 5*

proposed by the Executive Council on the proposal of Working Group 1

COSPAR,

*noting* the importance of timely analysis of visual tracking data for atmospheric studies,

*urges* observers to make their data available to the scientific community not later than one year from the day of observation.

#### *Decision No. 6*

proposed by the Executive Council on the proposal of Working Group 1

COSPAR,

*recognizing* the important contributions of the Central Bureau for Satellite Geodesy to many national and international satellite geodesy programs,

*invites* National Members of COSPAR to seek financial support for the Bureau so that its activities may continue. (This recommendation should be brought to the attention of IAG.)

#### *Decision No. 7*

proposed by the Executive Council on the proposal of Working Group 1

COSPAR,

*noting* with satisfaction that the lunar laser experiment has been successful in its initial phase, but

*recognizing* that the scientific value of the experiment will be fully realized only under the following conditions:

- when several retroreflectors are widely distributed on the lunar surface
- when there are as many terrestrial observing stations as practicable, well distributed geographically, with at least one station in the southern hemisphere
- when the data are made available to the scientific community

*urges* space agencies launching lunar landing spacecraft to place on the lunar surface more optical retroreflectors, some of which should be large enough to be used easily with one-metre telescopes,

*encourages* all countries to develop and build lunar laser ranging systems and to participate in the observations, and

*establishes* a working party of Working Group 1 on lunar laser ranging under the chairmanship of Dr C. O. ALLEY (USA) in order to initiate international coordination and data exchange in this field.

#### *Decision No. 8*

proposed by the Executive Council on the proposal of Working Group 2

COSPAR,

*recognizing* that a standard system of numerical indices for describing the solar proton events would be useful to the scientific community concerned, and

*noting* (1) that a Solar Proton Event Classification System, with indices based on data on proton fluxes from spacecraft, from riometers, and from terrestrial neutron monitors, has been proposed and provisionally adopted under IUCSTP auspices, and (2) that World Data Center A has agreed to calculate and publish these indices, *endorses* the Solar Proton Event Classification System and *recommends* its uniform use by research workers.

#### *Decision No. 9*

proposed by the Executive Council on the proposal of Working Group 4

COSPAR,

*noting* certain deficiencies in atmospheric studies as detailed below, *recommends* to the interested members of the world scientific community and to those agencies supporting them the adoption of the following program of investigations:

- At all altitudes above 90 km, but particularly in the 90 to 200-km region, measurements of density, temperature, pressure, mass motion and composition using instrumented rockets, low altitude satellites and ground-based radio techniques to determine the systematic variations of these parameters so that improved models can be developed for future COSPAR International Reference Atmospheres and other reference and standard atmospheres
- In the polar regions (latitudes above 70°) measurements of density, temperature and winds in the altitude range 25 to 400 km by instrumented rockets, low altitude satellites and ground-based techniques, essential to develop models of this region for the COSPAR International Reference Atmosphere.

#### *Decision No. 10*

proposed by the Executive Council on the proposal of Working Group 4

COSPAR,

*noting* the very small number of existing incoherent-scatter stations, the difficulties encountered by several of these, and the great importance of data obtained by this technique for the study of the interaction between the neutral and ionized parts of the atmosphere, their chemistry and dynamics;

*noting also* the importance of these measurements to ionosphere-magnetosphere interactions to be studied during the future international magnetospheric program (now under discussion);

*and further noting* the need for such data for the URSI-COSPAR International Reference Ionosphere;

*recommends* that all stations using this technique continue their observations on a regular schedule;

*and further recommends* that new stations applying this technique in its most modern form be established in regions of the world not presently covered.

The attention of URSI is drawn to this Recommendation.

*Decision No.11*

proposed by the Executive Council on the proposal of Working Group 5

COSPAR,

*proposes*

- that a joint COSPAR-IUPAB symposium on global biophysics be organized
- that the Symposium be held just before the XIVth COSPAR Meeting; and
- that Prof. VISHNIAC, Co-Chairman of COSPAR Working Group 5 explores with Dr TOBIAS, the IUPAB representative to COSPAR, the details of such a symposium, including the selection of topics and the general format

*Decision No.12*

proposed by the Executive Council

COSPAR,

*noting* that there is a need to coordinate conferences and other activities concerning investigations of the Moon that are of mutual interest to the Unions, as set out in a letter from IAU, and

*noting* that COSPAR already provides a forum for interdisciplinary and Inter-Union discussions of the Moon,

*recommends* to ICSU (1) that a small Inter-Union Lunar Coordinating Group be created, utilizing whenever possible the Union representatives to COSPAR Working Group 7, and (2) that the proposed Group be invited to meet at the same time and place as COSPAR.

*Decision No.13\**

proposed by the Panel on Planetary Quarantine

COSPAR,


*requests* the USSR Academy of Sciences to consider carefully the report of the Panel on Planetary Quarantine and to take steps for the communication of contamination reports of Soviet probes to Mars and Venus, which are urgently needed by its Panel on Planetary Quarantine.

*Decision No.14\**

proposed by the Panel on Planetary Quarantine

COSPAR,

*recommends* that the Jovian planets be treated with the same quarantine requirements (for flybys, orbiters or entryprobes) as currently apply to Mars, the requirement to be upheld until further information is available.

 \*Decisions Nos. 13 and 14. These decisions are subject for approval by the Consultative Group on Harmful Effects of Space Experiments which was not able to meet in Leningrad.



### *Decision No.15*

proposed by the Executive Council on the proposal of the Advisory Committee on Data Problems and Publications

COSPAR,

*noting* the offer of the IUWDS World Warning Agency for Satellites (SATWARN) to mail the *Spacewarn Bulletin* directly to all interested scientists, including members of COSPAR, and

*noting* that in fulfillment of Resolution 17 of COSPAR III (Nice) 1960, the COSPAR Secretariat is mailing to all members of COSPAR material on launching announcements and satellite designations which is substantially identical to material which regularly appears in the *Spacewarn Bulletin*,

*recommends* that the *Spacewarn Bulletin* be sent directly to all members of COSPAR by SATWARN and that this be considered fulfillment of Resolution 17 of COSPAR III (Nice) 1960.

### *Decision No.16*

proposed by the Executive Council on the proposal of the Advisory Committee on Data Problems and Publications

COSPAR,

*welcoming* the IAGA Scientific Resolution No.17\* on the quick release of satellite data, adopted during its Scientific General Assembly in Madrid, 1-12 September 1969, and

*noting* that these data are of great value to space scientists, especially if available on a timely basis, and

*noting also* that Decision 9 of COSPAR XII (Prague, 1969) provides that data of a routine monitoring nature obtained by rockets, satellites and space probes be treated in accord with the STP Guide (*STP Notes* No. 6) issued by IUCSTP instead of the COSPAR Guide,

*endorses* the IAGA Resolution and

*urges* COSPAR members to arrange mechanisms for the prompt forwarding of monitoring data to the appropriate STP WDC.

### *Decision No.17*

proposed by the Executive Council on the proposal of the Advisory Committee on Data Problems and Publications

COSPAR,

*noting* that the more timely availability of information about COSPAR activities and meeting plans would enable further participation of scientists mainly connected with the Scientific Unions represented in COSPAR,

\* See *IAGA News* No. 8, September 1969, page 14, for a text of this IAGA Resolution.

*recommends* that the COSPAR Executive Secretary contacts the appropriate officials of the Scientific Unions adhering to COSPAR and explores the possibility of accomplishing this end, and

*specifically recommends* that the Executive Secretary, in his explanatory letters, offers to make available photocopies of the *COSPAR Information Bulletin* to the various Union information publications prior to the printing and distribution of the *COSPAR Information Bulletin*. It is considered that such actions will permit wide distribution of information concerning COSPAR activities in a timely and useful manner.

*COSPAR further recommends* that the Executive Secretary extends this offer to ITU, CFIR, WMO, IAA and National Committees for various Unions which publish information bulletins (e.g. EOS) and to the editors of scientific news journals.

#### *Decision No. 18*

proposed by the Executive Council on the proposal of the Advisory Committee on Data Problems and Publications

COSPAR,

*noting* that it has been some time since the appointment of National Spacewarn Contacts in many countries,

*requests* that National Representatives of COSPAR confirm their present Spacewarn Contact or appoint a new one and notify the COSPAR Secretariat accordingly.

#### *Decision No. 19*

proposed by the Executive Council

COSPAR,

*noting* the need for cooperative program on the International Magnetospheric Survey and that the final Draft Program for IMS should be submitted for final approval at the 1971 COSPAR Meeting or earlier,

*endorses* in full the steps proposed in the recommendation of the IUCSTP Bureau of 27 May 1970 and

*offers* full cooperation of COSPAR in preparation and realization of this program.

#### *Recommendation of IUCSTP Bureau, 27 May 1970*

*Taking into account* the report presented to IUCSTP by members of the *ad-hoc* Committee on the International Magnetospheric Survey (IMS) established by COSPAR in 1969, and

*noting* that needs for cooperative research such as outlined in the 1969 COSPAR proposal have clearly emerged from discussions during the recent Symposium on Solar Terrestrial Physics, and further

*noting* that in view of the presently proposed time schedule for the IMS (1974–1976), the task of planning must be started immediately in order to be able to submit a final draft program for final approval not later than at the 1971 COSPAR Meeting and also

*taking into account* that a considerable amount of information for the preparation of such a draft program is already available in the form of IUCSTP and national study group reports,

IUCSTP requests COSPAR to endorse the following proposed action, to be taken by IUCSTP:

(1) IUCSTP takes the responsibility to define the scope, to draft a program, and later on to coordinate the work for IMS, in consultation with COSPAR and the participating Unions and countries.

(2) In order to organize such an enterprise, IUCSTP will create a Special Study Group to work with COSPAR for which it proposes the following membership:

GENDRIN R.

ROEDERER J.

HAERENDEL G.

SVETKA Z.

KING J.

VERNOV S.

NESS N.

ZHULIN I.

with a Convenor to be named from among these in consultation with COSPAR.

(3) This Study Group shall meet with representatives from ESRO, INTERCOSMOS and individual countries interested in contributing with satellite programs to the IMS not later than 15 February 1971, with the following agenda:

- (i) discussion of and agreement on a final name, principal scientific objectives and dates for IMS;
- (ii) identification and description of those satellites likely to be operating after the beginning of 1974;
- (iii) identification of obvious gaps in planned satellite coverage in time, space and instrumentation;
- (iv) review of current and planned ground-based research programs of relevance to IMS;
- (v) assignments of responsibilities for drafting a written report to be submitted to IUCSTP and COSPAR for consideration in June 1971.

(4) Based on the report of the Special Study Group for IMS, IUCSTP would organize its Working Group structure in such a way as to ensure a full-scale participation of all solar-terrestrial disciplines in support of and as a complement to IMS.

## **REPORTS ON IUPAC ACTIVITIES**

### **COMMISSION ON MOLECULAR STRUCTURE AND SPECTROSCOPY (I.5)**

*Sydney, 18-19 August 1969*

Joint Sessions of Commission I.5 and Sub-Commission I.5.1 were held in Sydney (Australia) on 18 and 19 August 1969 at the Fisher Library of the University of Sydney. The following were present:



*Titular Members:* R. N. JONES, Chairman (Canada); A. R. H. COLE, Vice-Chairman (Australia); F. A. MILLER, Secretary (USA); M. A. ELEYASHÉVICH (USSR).

*Sub-Commission I.5.1:* R. C. LORD, Chairman (USA).

*By invitation:* C. C. COSTAIN (Canada).

Reports received from the following Commission Members were discussed at the Meeting:

*Titular Members:* Y. MORINO (Japan); N. SHEPPARD (UK).

*Associate Members:* E. R. LIPPINCOTT (USA); J. PLIVÁ (Czechoslovakia).

*Members of Sub-Commission I.5.1:* B. L. CRAWFORD (USA); I. M. MILLS (UK); G. R. WILKINSON (UK).

*Member of Sub-Commission I.5.2:* T. SHIMANOCHI (Japan).

### *Wavenumber Calibration Tables for Far Infrared*

Technical aspects of the Tables were reviewed. Progress with the region 300–20  $\text{cm}^{-1}$  justifies dealing with the complete wavenumber range in a single publication and it was agreed not to proceed with an interim publication covering 600–300  $\text{cm}^{-1}$ . Two sets of Tables will be produced, one of  $\pm 0.5 \text{ cm}^{-1}$  accuracy for the calibration of small instruments used in analytical survey work, and a second set of  $\pm 0.03 \text{ cm}^{-1}$  accuracy for high resolution measurements.

### *Units, Symbols and Nomenclature for Absorption Spectrophotometry*

Sections 2.8.09–2.8.15 of the *Manual of Symbols and Terminology for Physicochemical Quantities and Units* were discussed. The draft version of the Manual, which was published in *IUPAC Information Bulletin* No. 32 (Sections 2.8.09–2.8.18), was in satisfactory accord with contemporary usage in absorption spectrophotometry, but the version finally approved at the XXVth IUPAC Conference contained several omissions and changes; these were compromises made to achieve compatibility with the nomenclature and symbolism approved by the International Electrotechnical Commission and the International Commission on Illumination. Unfortunately the changes so introduced constituted significant departures from current practice in absorption spectrophotometry. The Commission will draw these changes to the attention of spectroscopists and if necessary recommend modifications and additions to Commission I.1. Specifically it was noted that the current listing in the Manual does not recommend approved symbols and nomenclature for  $\ln(T^{-1})$  and the quantities derived from it; nor for the quantity  $D_1/lc$  where  $c$  is expressed as mass per unit volume; nor for the complex refractive index including its separate real and imaginary components.

### *Microwave Spectroscopy*

The Commission discussed reports from COSTAIN and MORINO concerning alternatives to the name “microwave spectrum”. These spectroscopists, both eminent specialists in this field, reported that there is a consensus among microwave spectroscopists that the name “microwave spectrum” is well understood and firmly established in the scientific literature. If further qualification is needed “microwave rotation spectrum” and “microwave inversion spectrum” are adequate. The Commission took notice of this expression of informed opinion.



MORINO also submitted a letter from W. H. KIRCHHOFF which has been circulated among microwave spectroscopists. In this the need for more precise standardization of certain key values is noted. These are the conversion constant relating the rotational constant and the moment of inertia and the standard dipole moment of carbon oxy-sulfide. The Commission would be willing to assist with this if asked to do so by microwave spectroscopists.

### *Nuclear Magnetic Resonance Spectroscopy*

A minor addendum, submitted by SHEPPARD, was appended to the report on *Recommendations for the Presentation of NMR Data for Publication in Chemical Journals*. It was agreed that this report be now submitted to the President of the Physical Chemistry Division with a request for prompt publication.

### *Evaluation, Storage and Retrieval of Spectral Data*

Subsequent to the publication of *Tentative Specifications for the Measurement and Evaluation of Infrared Spectral Data for Documentation Purposes*, in *IUPAC Information Bulletin* No. 34, comments have been received from A. NIKITIN and J. B. WILLIS. These concern technical details and call for more stringent control of the spectral slit width and wavenumber accuracy, more accurate definition of the sample path length, and more consideration of errors caused by re-radiation of energy from the sample material. The Commission expressed its thanks for these constructive suggestions. It is necessary to point out that these specifications are intended as guidelines for the evaluation of spectra going into data collections for identification purposes. If the specifications are too exacting they could become self-defeating for this purpose.

The Commission also discussed the problem created by the archival storage of the voluminous data which may accrue from computer-based computations of band contours; this can be particularly serious for electronic spectra of materials in the vapor phase. It was agreed that this is a general problem, not unique to molecular spectroscopy and that the Commission suggests it be drawn to the attention of CODATA.

### *Raman Spectroscopy*

Sub-Commission I.5.1 reported that an *ad-hoc* committee, convened by E. R. LIPPINCOTT, had met at Ottawa in association with the International Conference on Raman Spectroscopy (4 August 1969). Its purpose was to consider problems of obtaining standard Raman spectra for reference purposes. Later it will submit a report to the Infrared and Raman Sub-Commission. It was suggested that a similar committee be encouraged to meet in association with the Second International Conference on Raman Spectroscopy to be held in Oxford in September 1970, and that the Sub-Commission endeavors to coordinate these and other reports into a set of specific recommendations before the XXVIth IUPAC Conference at Washington in July 1971.

### *Photoelectron Spectroscopy*

A draft set of recommendations for the presentation of photoelectron spectra in chemical journals has been prepared by SHEPPARD. This was approved in principle

and SHEPPARD was requested to arrange for its circulation among specialists in the field. The Commission felt that a firm recommendation concerning the direction of the energy scale should be made as soon as possible. This might well increase to the right as there is no requirement to conform with chemical usage in ultraviolet and infrared spectroscopy.

A letter from I.M. MILLS was acknowledged. This drew attention to ambiguities in the usage of the terms "first ionization potential . . . second ionization potential, etc. . . ." by photoelectron spectroscopists. It was referred to SHEPPARD for further consideration.

### *Mössbauer Spectroscopy*

A letter from GOLDANSKI, submitted by ELEYASHÉVICH, was acknowledged. It was agreed that this, together with earlier correspondence from MAY and SPIKJERMAN, should be referred to FLUCK with a request to ascertain the views of other Mössbauer spectroscopists. A draft of tentative specifications for symbolism, nomenclature and data presentation should be prepared in advance of the XXVIth IUPAC Conference.

### *Other Business*

A request from T. SHIMANOUCHI that the Commission gives attention to the units for force constants was noted. It was agreed that this be referred back to SHIMANOUCHI with a request that he submit some positive proposals.

The next meeting of the Commission will take place at Washington, DC (USA) at the XXVIth IUPAC Conference (15–24 July 1971).

R. N. JONES

F. A. MILLER

## **XXIInd IUPAC CONGRESS—XIIth ICC CONFERENCE**

*Sydney, 20–27 August 1969*

The XXIInd Congress of the International Union of Pure and Applied Chemistry was held in Sydney, Australia, from 20 to 27 August 1969, in conjunction with the XIIth International Conference on Coordination Chemistry. The meetings were organized by a committee of the Australian Academy of Science and were held simultaneously and contiguously in the University of Sydney. This is the first occasion on which an ICC meeting has been held in association with a IUPAC Congress. The participants paid a single registration fee and could move freely from one meeting to the other; a number of functions were common to both.

The International Union of Pure and Applied Chemistry was represented at the meetings by the President, Dr A. L. G. REES, the immediate Past-President, Prof. V. N. KONDRATIEV, the Vice-President, Prof. J. BÉNARD, the Treasurer, Prof. J. C. BAILLAR, Jr, and Prof. J. LECOMTE, a Member of the Executive Committee. The International Conferences on Coordination Chemistry were represented by the Permanent Secretary, Prof. S. KIRSCHNER, and the Chairman of the Organizing Committee for the XIIIth ICC to be held in Poland in 1970, Prof. Dr B. JEZOWSKA-TRZEBIATOWSKA.

An official delegation came from the Academy of Sciences of USSR, led by Prof. V.I. SPITSYN; the Royal Flemish Academy of Sciences, Literature and Fine Arts was represented by Prof. M.D'HONT, and the Comité suisse de la Chimie by Prof. G. SCHWARZENBACH. The Chemical Society of London was represented by Prof. Sir RONALD NYHOLM, Prof. W. KLYNE, Dr J. W. BARRETT, Dr L. C. CROSS and Mr J. RUCK KEENE, and the American Chemical Society by its President, Dr WALLACE R. BRODE. Two members of the Organizing Committee for the XXIIIrd IUPAC Congress attended: Dr M. A. PAUL, Executive Secretary of the National Research Council, and Mr A. T. WINSTEAD, of the American Chemical Society.

The meetings were attended by 1300 full participants and 100 accompanying members, from 31 countries.

The program was in four parts: Physical Chemistry, Macromolecular Chemistry, Inorganic Chemistry and Coordination Chemistry (XIIth ICCG), with some interaction between the last two. As is customary at such meetings three classes of papers were included in the program: invited Plenary Lectures of approximately one hour's duration; invited Section Lectures of thirty to thirty-five minutes; and Contributed Papers, for each of which the total time available, including discussion, was twenty minutes. There were 22 Plenary Lectures\*, 48 Section Lectures and 400 Contributed Papers, of which 127 were from Australia and 273 were from 25 overseas countries. Because of the number of divisions, and of sections within divisions, it was necessary to hold up to eleven concurrent sessions. The Plenary Lecturers were: A. D. BUCKINGHAM (UK), J. CHATT (UK), C. A. COULSON (UK), R. DAUDEL (France), B. V. DERJAGUIN (USSR), E. O. FISCHER (German Federal Republic), O. FOSS (Norway), E. U. FRANCK (German Federal Republic), D. H. FUERSTENAU (USA), P. HAGENMULLER (France), J. JORTNER (Israel), B. G. MALMSTRÖM (Sweden), S. F. MASON (UK), R. S. MULLIKEN (USA), I. E. NEWMAN (Australia), S. OKAMURA (Japan), C. SCHÄFFER (Denmark), G. SCHWARZENBACH (Switzerland), H. TAUBE (USA), J. H. VAN VLECK (USA), O. WICHTERLE (Czechoslovakia), S. WINSTEIN (USA).

The meeting was opened in the Sydney Town Hall on the morning of Wednesday, 20 August, by the President of the Australian Academy of Science, Dr D. F. MARTYN. His speech was followed by short addresses by Dr A. L. G. REES, President of the International Union of Pure and Applied Chemistry, and President of the XXIIInd IUPAC Congress, and by Prof. Sir RONALD NYHOLM, President of the XIIth International Conference on Coordination Chemistry. Prof. O. WICHTERLE of Czechoslovakia, the first President of the Macromolecular Division of IUPAC, then delivered the opening Plenary Lecture on *Prospects of Macromolecular Science*. In the afternoon and throughout the rest of the Conference, proceedings were conducted in the University of Sydney, mostly in the compact area of the Carslaw and Chemistry Department buildings, though Plenary Lectures—three or four daily—were held in the Union Theatre about 600 yards away.

The scientific program occupied two three-day periods, 20–22 and 25–27 August, with a weekend break between. This was planned to provide relaxation and an opportunity for overseas visitors to see something of Sydney and its environs. The program was supplemented by social events in the evenings and over the weekend. These included a reception for all participants, held in the Australian Museum on the

\*In course of publication in the IUPAC journal *Pure and Applied Chemistry*.



opening night, and the IUPAC and ICCG banquets on Tuesday, 26 August. At the former the toast to IUPAC was proposed by the Secretary of the Department of Education and Science, Sir HUGH ENNOR, representing the Minister, and replied to by Prof. J. BÉNARD (France), President-elect of IUPAC. On Friday, 22 August, many participants attended dinners arranged by a dozen supporting companies and organizations, including the New South Wales Branch of the Royal Australian Chemical Institute. On Monday, 25 August, participants could choose between a number of theatre parties and also a special chamber music concert, held in the informal dining surroundings of the Music Hall Restaurant.

The IUPAC Congress closed with a special symposium on *Fifty years of valence theory*. Here the speakers, all of whom had themselves forged much of our present understanding of chemical binding processes, took retrospective views of the route by which the present state of theory has been reached. They were Prof. R. S. MULLIKEN (USA) (*The path to molecular orbital theory*), Prof. R. DAUDEL (France) (*Relation between structure and reactivity of organic molecules*), Prof. J. H. VAN VLECK (USA) (*Spin, the great indicator of valence behavior*), and Prof. C. A. COULSON (UK) (*Recent developments in valence theory*).

The XIIth ICCG concluded immediately before the final session of the Valence Symposium. Following the final Plenary Lecture by Prof. J. CHATT (UK) entitled *Some reactions of nitrogen ligands*, the President presented the traditional gavel, in a box newly inscribed to mark the Sydney meeting, to the Chairman of the forthcoming XIIIth ICCG in Poland, Prof. Dr B. JEZOWSKA-TRZEBIATOWSKA.

The meeting itself was concluded following Prof. COULSON's lecture. Dr REES bade farewell to the participants and Prof. J. C. BAILAR extended a warm invitation to the next IUPAC Congress in USA.

S. D. HAMANN

## **MEDICINAL CHEMISTRY SECTION (III.4)**

### **Inaugural Meeting**

*Zürich, 13–15 February 1970*

#### *Location*

Morning and afternoon sessions on 13–14 February 1970 were held in the administration building of Givaudan-Esrolko AG, Dübendorf-Zürich, and a morning session on 15 February 1970 was held in the Hotel St. Gotthard, Zürich.

#### *Participants*

Section Chairman: Prof. E. CAMPAIGNE; Section Secretary: Dr A. I. RACHLIN; Secretary General, IUPAC: Dr R. MORF, Secretary General; Titular Members: Prof. E. J. ARIENS, Dr F. L. ROSE, Prof. P. SENSI; Associate Members: Prof. J. A. GAUTIER, Dr M. PROTIVA, Dr L. H. STERNBACH; Guests (present part-time): Dr H. FRIEBEL (Geneva, representing WHO), Prof. R. HUNSPERGER (Zürich, representing IUPS), Prof. C. MARTIUS (Zürich, representing IUB), Dr J. RUTSCHMANN (Sandoz AG, representing the Basle chemical industries), Dr C. COMBET-FARNOUX (Paris, assisting Prof. GAUTIER), Dr J. THUILLIER (Paris, representing Société de Chimie Thérapeutique and European Federation of Medicinal Chemists).



*Absent*—Titular Members: Prof. A. ALBERT, Prof. V. A. YAKOVLEV; Associate Members: Dr L. HUMBER, Prof. T. URBANSKI.

### *Agenda*

The following agenda (Roman numerals) was prepared prior to the first session by the Chairman and the Secretary.

- |      |      |         |  |
|------|------|---------|--|
| I    | (1)  | 2/13    | An introduction and welcome  |
| II   | (2)  | 2/13    | Remarks by the Chairman  |
| III  | (3)  | 2/13    | Definition of scope of operations  |
| IV   | (4)  | 2/13    | Coordination with existing organizations. Can we set up a group of correspondents representing these organizations?  |
| V    | (7)  | 2/14    | Involvement of biologists (pharmacologists, physiologists, bacteriologists, biochemists, chemotherapists, microbiologists, etc.)   |
| VI   | (6)  | 2/14    | Symposia and scientific meetings   |
| VII  | (8)  | 2/14    | Standing committees  |
| VIII | (5)  | 2/13    | Liaison  |
| IX   | (9)  | 2/14–15 | Organizational matters:<br>a) Officers of the Section<br>– Executive Committee<br>– Election of Officers<br>b) Future meetings<br>c) Budget<br>d) Continuity of membership |
| X    | (10) | 2/15    | Concluding remarks   |

### *Proceedings*

The first session began with opening remarks by Prof. CAMPAIGNE, Dr MORE, a welcome on behalf of Givaudan-Esrolko AG by Dr P. SCHUDEL, and brief statements by each member (*Items 1,2*). The agenda was accepted with the proviso that the topics be discussed in the order indicated by the Arabic numerals so as to accommodate some of the guests on the first day of the meeting. The date on which each topic was discussed is indicated in the third column of the agenda.

*Item 3* This matter was discussed in depth and the conclusions have been incorporated into Section 1 of the attached document.

*Item 4* It was agreed to request all existing organizations operating within our scope of operations to appoint a Correspondent (who will have official IUPAC status and possibly be listed in *IUPAC Comptes Rendus*). Official international organizations exemplified by WHO will be asked to appoint a Representative. According to Dr WILLIAMS this distinction between Correspondents and Representatives has precedent in IUPAC operations. The purpose of making these contacts will be to establish a reciprocal exchange of information between these organizations and our Section which will be represented in all cases by the Secretary. The Secretary will issue a *Section Newsletter* at irregular intervals (probably twice a year) in order to disseminate information to all interested parties. Formalization of these decisions is incorporated into Sections 2 and 3 of the attached document and delineated on the organizational chart.

*Item 5* Prof. HUNSPERGER outlined the operation of IUPS. He indicated that it is their custom to appoint observers to meetings in which IUPS is interested. This can be done with our Section on a reciprocal basis. Our Secretary will contact Prof. HUNSPERGER to formalize this arrangement. IUPS will send us its Newsletter and we shall send them ours when issued.

Dr FRIEBEL gave a thorough report on the activities of WHO. He pointed out that official relations already exist between WHO and IUPAC (through the Secretary General) and some matters which have been proposed as our areas of interest are already being handled effectively by WHO. This includes generic names and biological standardization. It was the unanimous feeling of the membership that our interests are purely scientific and we will not be concerned with generic names, drug standardization, standardization of tests, toxicity and purity of drugs, patents (except for the point mentioned in Item 8 below), etc. Our interest should be limited to giving advice to interested parties *if requested*. Towards this end the Secretary will contact the following WHO personnel: Mr O. WALLEN, Dr A. OUTSCHOORN, Dr TOMATIS and establish the proper liaison. On his part Dr FRIEBEL will send the Secretary a list of WHO personnel in the Division of Pharmacology and Toxicology who are concerned with medicinal chemistry matters.

*Item 6* Since one of the primary objects of the Section will be the promotion of scientific symposia on timely topics, this matter was discussed in depth. It was decided to set up a *Standing Committee on Symposia and Scientific Meetings* the first task of which will be to gather information and funnel it to the Secretary. Prof. ARIENS will chair this Committee and Prof. CAMPAIGNE (after consultation with Prof. ARIENS) will appoint additional volunteers from the Western Hemisphere, Europe and Asia. Both the Chairman and Secretary will serve as *ex-officio* Members of this Committee. Prof. ARIENS' first task will be to contact the German organization (GDC, Dr W. FRITSCH, Geschäftsführer) concerning the feasibility of setting up a medicinal chemistry symposium as part of the 1973 IUPAC Congress in Hamburg.

*Item 7* It was generally agreed that chemists show a greater interest in other disciplines than their biological counterparts, with chemotherapists being generally more amenable to crossing scientific boundaries than pharmacologists. We hope to break down this barrier with the establishment of Correspondents and Representatives (Item 4) and the distribution of our Newsletter. Dr MORF was delegated to bring up this matter of establishing communications at the IUPAC-IUB liaison meeting scheduled for the following week and report to the Secretary.

*Item 8* The Standing Committee on Symposia and Scientific Meetings has been mentioned under Item 6. Two other committees were set up:

(a) An *ad-hoc* Committee on Education of Medicinal Chemists. This will be made up of volunteers recruited by Prof. CAMPAIGNE with the advice of Prof. ARIENS and Prof. SENSI concerning possible European members. The Committee will be a fact-finding body. Further activities, if any, will be determined by the Committee report.

(b) An *ad-hoc* Committee made up of Dr PROTIVA and Dr ROSE will investigate bad patent practices—specifically so-called paper patents in which compounds which have never been made are disclosed and ultimately indexed in the chemical literature. While this is a matter of concern to all chemists, the situation is particularly acute in the field of medicinal chemistry. This Committee will gather the facts and any further action will be predicated by its report.

*Item 9* This matter was discussed in great detail and the results, which were unanimously approved, are incorporated into Section 4 of the attached document. The budget will be incorporated into our report to the Division Chairman (Prof. BARTON) which will be submitted by 1 May 1970.

*Item 10* The meeting closed with general expressions of satisfaction on the positive achievements of the organizational meeting. Thanks were extended to Givaudan-Esrolko AG for use of their facilities, the Associate Members and guests for attending and to Miss S. MÜLLER for her efficient secretarial services. The next meeting will be arranged to coincide with the XXVIth IUPAC Conference to be held in Washington, DC (USA), in July 1971.

A. I. RACHLIN

## **CONSTITUTION OF MEDICINAL CHEMISTRY SECTION OF ORGANIC CHEMISTRY DIVISION OF IUPAC**

### *(1) Definition and Scope of Section*

Medicinal chemistry is known in different countries by a variety of terms which are possibly, but not necessarily, synonymous. Consequently it is necessary to define this term in order to outline the scope of the Section of Medicinal Chemistry, IUPAC. Implicit in the definition is the aim of the Section which, in fact, is the promotion of this branch of science.

Medicinal chemistry concerns the identification of biologically active compounds, the interpretation of their mode of action on the molecular level, and their development. While emphasis is put on the discovery and development of drugs, as suggested by the adjective "medicinal", the interests of the medicinal chemist are not restricted to drugs *per se*. Medicinal chemistry is also concerned with the study, identification, and synthesis of the metabolic products of drugs and related compounds. The study of the relationship between molecular structure or the chemical and physical properties of a substance and its biological action is another major concern of the medicinal chemist.

Clearly, in these activities, chemists and biologically oriented scientists must work together. The question of overlap or competition with other disciplines must be subordinated by these scientists in a cooperative effort to achieve the goals of medicinal chemistry.

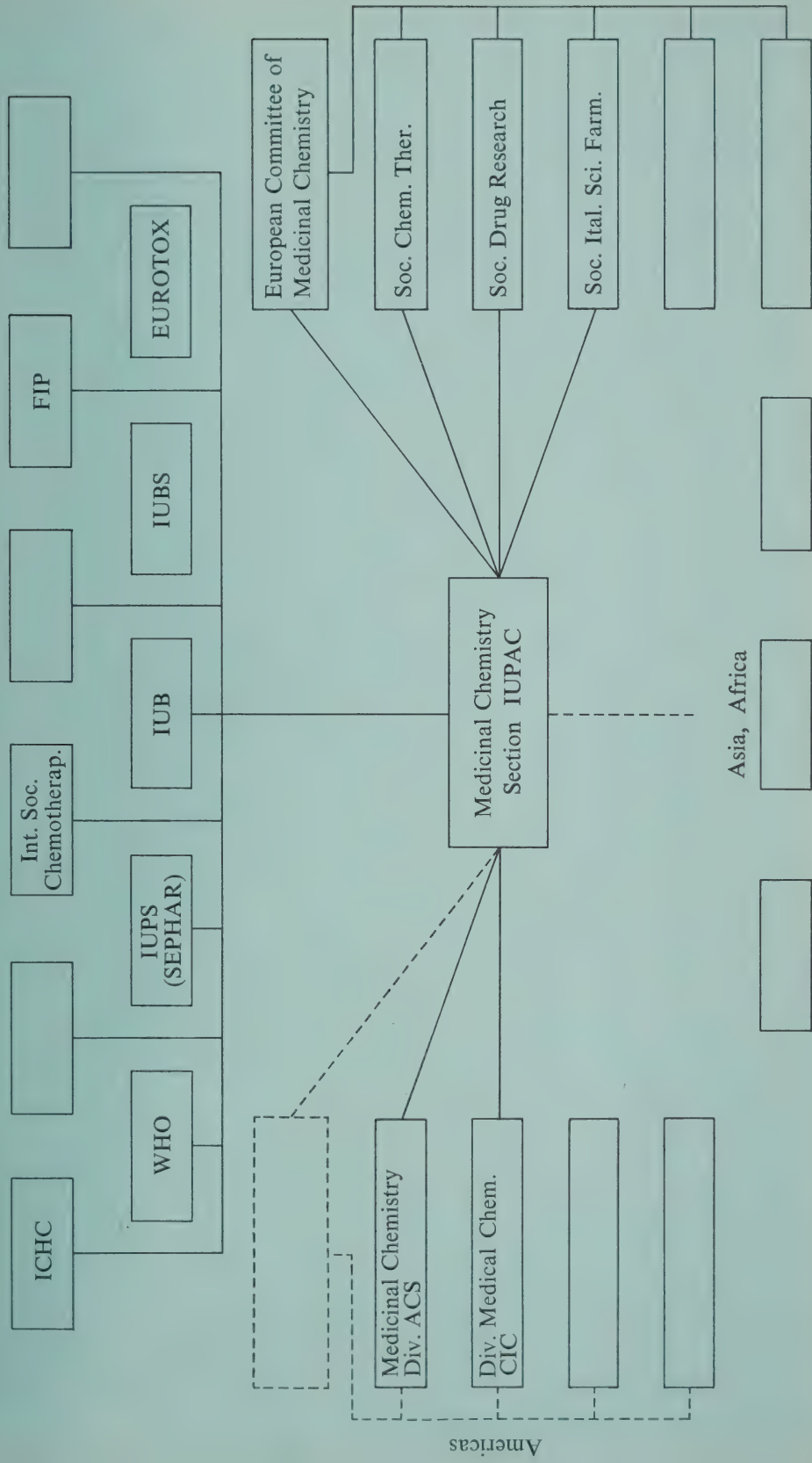
### *(2) Objects of the Section*

The primary objects of the Section of Medicinal Chemistry are:

- (a) to promote continuing cooperation among the medicinal chemists of IUPAC member countries
- (b) to cooperate with other international organizations which deal with topics of a medicinal chemistry nature
- (c) to advise international organizations in matters concerning regulations, standardization, and codification in the field of medicinal chemistry
- (d) to contribute to the advancement of medicinal chemistry in all its aspects



# A proposed Organizational Chart for International Medicinal Chemistry





As ways of achieving these goals, the Section will promote international scientific meetings, publications and personal contacts among scientists within the discipline, and will assist national organizations in their activities.

### (3) *Relationship with National and International Bodies*

The Section of Medicinal Chemistry, a unit of the Division of Organic Chemistry, provides a central organization for implementation of the objectives outlined in section (2). It coordinates the activities of the various national groups concerned with medicinal chemistry by the appointment of Correspondents to the regional and national organizations on a reciprocal basis, the Secretary acting for the Medicinal Chemistry Section. The cooperation with those international bodies which deal with topics related to medicinal chemistry may be channeled through the Medicinal Chemistry Section of IUPAC. This relationship is delineated in the accompanying chart.

### (4) *Internal Organization of the Section—Membership and Officers*

The Section consists of Titular and Associate Members in accord with the Statutes of IUPAC. An Executive Committee composed of the Chairman and the Secretary is responsible for the routine operation of the Section. These Officers serve four-year terms. The Chairman is limited to a single four-year term of office. The Secretary, however, can stand for re-election to a second four-year term. In the year prior to the expiration of the terms of these Officers the Members will nominate candidates for Secretary and Chairman-elect, who will succeed to the Chairmanship. Each nominee must have agreed to serve and must have been seconded by a Section Member.

Nominations for Associate Membership will be solicited from the Members as well as from the Correspondents from medicinal chemistry groups. Candidate Members must have expressed their willingness to accept and fulfill their obligations. Qualified candidates for Associate Membership will then be proposed for election in the normal IUPAC manner. Titular Members will, whenever possible, be selected from the Associate Members. Starting with the next selection of members, both two and four-year terms will be offered in order to provide continuity of membership by the resulting overlapping terms of office.

All elections will be conducted by the Secretary and will consist of a secret postal ballot. Invitations for nominations must be made at least four months prior to the election.

## **ORGANIC CHEMISTRY DIVISION SECTION ON MEDICINAL CHEMISTRY**

Newsletter No. 1, July 1970

*Published by courtesy of Prof. E. CAMPAIGNE, Chairman  
and Dr A.I. RACHLIN, Secretary*

Dear Member:

While the Section Newsletter is addressed to the Membership, it is also sent to organizations with which we have established a liaison. Consequently this first issue contains information which is well-known to our members and is intended primarily

for our Correspondents. For this redundancy, which will be avoided in the future, we ask your indulgence.

### *Committees*

The following committees were established to function by postal contact and to report at the next meeting of the Section which is scheduled to coincide with the XXVIth IUPAC Conference to be held in July 1971 at Washington, DC (USA).

(1) *Standing Committee on Symposia and Scientific Meetings*, Prof. ARIENS, Chairman. Other members are Dr B. BLOOM (USA), Prof. K. TAKAGI (Japan), and Dr N. HARPER (UK). The Chairman and Secretary of the Section are *ex-officio* Members of this and the other Committees.

(2) *An ad-hoc Committee on Education of Medicinal Chemists* made up of volunteers recruited from outside the Section and appointed by the Chairman with the advice of the Membership. The names of the members of this Committee will be announced when formal acceptance has been received.

(3) *An ad-hoc Committee to Investigate Bad Patent Practices*. This Committee, made up of Dr PROTIVA and Dr ROSE, is already functioning.

### *Representation at meetings of existing international organizations*

IUPAC was asked to send official representatives to the XXIIIrd General Assembly/XXXth International Congress of Pharmaceutical Sciences (ICPS), Geneva, 31 August to 5 September 1970 and the Council for International Organizations of Medicinal Sciences (CIOMS), Geneva, 10–11 September 1970. The Chairman has nominated Prof. GAUTIER to represent IUPAC at ICPS and Prof. ARIENS to represent IUPAC at CIOMS.

### *Correspondents*

As of 1 July 1970, the following organizations have agreed to appoint Correspondents to our Section:

American Chemical Society, Division of Medicinal Chemistry

Correspondent: Dr ARTHUR A. PATCHETT, Secretary

Chemical Institute of Canada, Medicinal Chemistry Division

Correspondent: Dr M. A. DAVIS, Past-Chairman

Czech Chemical Society (or an appropriate division)

Correspondent: Dr M. PROTIVA, Chairman Prague Branch

International Society of Chemotherapy

Correspondent: Dr G. H. WERNER, Secretary General

International Society of Heterocyclic Chemists

Correspondent: Mrs M. MALM, Corresponding Secretary

International Society of Quantum Biology

Correspondent: Dr W. P. PURCELL, Secretary

Society for Drug Research

Correspondent: Dr A. SIMMONDS, Secretary

Società Italiana di Scienze farmaceutiche

Correspondent: Prof. P. PRATESI, President

The following organizations have been contacted but, as of 1 July 1970, there have been no positive developments:

European Committee on Medicinal Chemistry—Dr J. THUILLIER, General Secretary  
Food and Agriculture Organization, UN (FAO)—Dr J. V. A. NEHEMIAH, Director,  
International Agency Liaison Division  
Pharmaceutical and Drug Research Committee (India)—Dr N. ANAND, Secretary

## INTERNATIONAL CONFERENCE ON THERMODYNAMICS

*Cardiff, 1–4 April 1970*

The above Conference, sponsored by IUPAC, was attended by about 180 persons with about 20 wives. Somewhat more than half of the participants came from abroad, including contingents from USA, France, Germany, Canada, Italy, New Zealand, Belgium, Holland, etc. The Organizing Committee paid the fares of a number of invited speakers, including those of D. LAYZER (Harvard) and C. PETHICK (Nordita). There were seven Conference sessions which covered a wide range of Thermodynamics, Statistical Thermodynamics and border-line topics in which Thermodynamics is utilized in a novel or unusual context:

- (1) Phases, Surfaces and Thermodynamic Limit
- (2) Foundations
- (3) Irreversibility and Quantum Mechanics
- (4) Thermomechanics
- (5) Statistical Thermodynamics in Astrophysics and Relativity
- (6) Late Papers
- (7) Pedagogical Papers

The papers were, on the whole, of good standard and there were discussions following most of them.

The Conference contained three lively discussion sessions, which were given focus by signed statements. These were invited by the Organizing Committee who asked for such statements to be “provocative”, in the notices for the meeting. All participants had copies of their statements beforehand. Judging by the attendances, even at the last session (on Saturday morning) this seemed a popular procedure. The contributions at these three discussion sessions were tape recorded, even though they were spontaneous, and a debt is owed to the three gentlemen who kindly agreed to write the reports for the Proceedings.

A second unusual feature of the meeting was that one complete session was devoted to the problems raised by the teaching of the subject. A third unusual feature was that manuscripts were sent in early and proofs were read at the meeting. The willing cooperation of the publishers\* and authors was a great help in this connection.

The Organizing Committee consisted of: Prof. P. T. LANDSBERG (Cardiff), Chairman; Prof. D. H. EVERETT (Bristol); Prof. F. C. FRANK (Bristol); Prof. E. J. LE FEVRE

\*The proceedings have been published in the IUPAC journal *Pure and Applied Chemistry* **22** (3/4) (1970).



(London); Prof. M. L. McGLASHAN (Exeter); Dr A. HARVEY (Cardiff), Chairman—Local Committee; Dr D. J. MORGAN (Cardiff), Honorary Secretary.

P. T. LANDSBERG

**TASK GROUP ON STANDARD CALIBRATION SUBSTANCES**  
**Commission on Physicochemical Measurements and Standards (I.4)**

*Ludwigshafen (West Germany), 18–19 June 1970*

*Present:* S. ANGUS\*, E. BRUNNER, J. P. CALI, J. COX\*, H. FEUERBERG, E. F. G. HERINGTON, H. KIENITZ (Chairman of the Task Group), W. SIMON, W. M. SMIT, D. R. STULL (Chairman of Commission I.4).

Members of the Task Group have submitted 121 proposals for calibration substances that we wish to evaluate and convert into uniform proposals that will be approved by the whole Commission. The following guiding principles were agreed upon:

- (1) The International System of Units shall be used and given primary display. Until the SI units are universally used, an interim period will exist during which time alternative traditional units may be given secondary display providing the specific conversion factors from the traditional to the SI units are clearly stated on each page.
- (2) ISO Recommendation R 1000, Rules for the Use of Units of the International System of Units and as later amended by BIPM, shall be adhered to.
- (3) The *Manual of Symbols and Terminology for Physicochemical Quantities and Units (Pure and Applied Chemistry* **21**, 1–44 (1970)) recently completed by Commission I.1, shall be adhered to.
- (4) The *Values of the Fundamental Constants for Chemistry* [F. D. ROSSINI, *Pure and Applied Chemistry* **9**, 453–459 (1964)], and the latest Table of Atomic Weights [see *Comptes Rendus XXV Conference*, Cortina (Italy), July 1969] adopted by IUPAC shall be adhered to.
- (5) Three classes of Standard Calibration Substances are recognized, and are tentatively described as:
  - (5.1) Primary Standard Materials, for example the use of gold to define a primary point on the temperature scale, where a unique property of the material defines the scale.
  - (5.2) Calibration Materials, for example the use of Certified Benzoic Acid to transfer a quantity of heat from one laboratory to another, or the use of water to calibrate the volume of a pycnometer.
  - (5.3) Test Materials, for example a certified fluorine compound for testing the procedure for working measurements on materials of this type, or a synthetic composition of matter used to test the separation efficiency of a still.

Care must be exercised in the definition of the word MATERIAL.

- (6) A certified standard material derives its authority from the earned reputation of the certifying laboratory. For example, a sample of benzoic acid that is certified

\* Delegates from Commission on Thermodynamics and Thermochemistry (I.2)



to have a given heat of combustion. This Task Group does not authenticate a value certified by a laboratory, but can recommend physical property values that are believed to be the most accurate. For example, the temperature-heat capacity function for a material of defined origin.

(7) For each Material recommended the method of measurement must be noted with appropriate references to a description of the method. Discussion and description of methods of physicochemical measurements is not the object of this Task Group.

(8) A statement of the intended usage of a material is essential.

(9) Name and address of one (or preferably more) supplier shall be included for each material if possible.

(10) The work of screening and proposing materials will be carried out by 12 teams (\* = captains):

(10.1) Density, BROWN\*, HERINGTON, CALI

(10.2) Viscosity, SMIT\*

(10.3) Surface Tension, BROWN\*, FRANC

(10.4) PVT Data, Phase Equilibria (1-Component), ANGUS, HERINGTON\*, THOMAS

(10.5) Calorimetry (Heat Capacity, Heat of Fusion and Transition, Heat of Vaporization, Heat of Combustion, Heat of Reaction, Heat of Solution), COX\*, CALI, STULL

(10.6) Transport Properties (Thermal Conductivity, Heat Transfer), BRUNNER\*, STULL

(10.7) Distillation Column Performance (PVT x for Mixtures), KIENITZ\*, SMIT, BRUNNER, HERINGTON, BROWN

(10.8) Optical Properties (Light Absorption, Light Reflection, Light Refraction, Light Polarimetry, Wavelength Scale), BROWN\*, FRANC, MASHIKO, FEUERBERG, (BAM)\*\*

(10.9) Dielectric Constants, Permittivity, KIENITZ\*, (PTB)\*\*\*, CALI

(10.10) Potentiometric Ion Activities, CALI\*, SIMON

(10.11) Temperature Test Materials, SMIT\*, KIENITZ, CALI

(10.12) Molecular Weight, SIMON\*, SMIT

(11) Physical properties in the vicinity of 1 atmosphere pressure are desired for all of the above fields with the exception of (10.4), which is desired for a range of pressures extending from 1 to at least 25 atmospheres.

(12) Each team should first list all possible materials that are available for their field, then propose other materials for consideration. Items should be selected for adoption that are readily available. The total list should be minimized by having a material serve as many purposes as possible.

(13) The reporting format used up to now should be revised by J. COX, E. BRUNNER, and H. KIENITZ to include the guiding principles listed here.

(14) Each team captain may seek competence to assist in the task, and should be considered the contact in all correspondence between the competent outsider and the Task Group.

(15) Each team captain must make a complete progress report for his team to H. KIENITZ (via Air Post) by mid-April, 1971. These reports will be duplicated and distributed to the whole Commission (via Air Post) in early May 1971, for review

\*\*FEUERBERG and KIENITZ to contact experts from respectively BAM and PTB (BAM = Bundesanstalt für Materialprüfung, Berlin; PTB = Physikalisch-Technische Bundesanstalt, Braunschweig)

and discussion by the Task Group and Commission at the IUPAC Conference, Washington, DC, in July 1971.

(16) This Task Group complements I. BROWN on his report entitled *Standard Substances for Use in the Measurement of Density, Refractive Index, and Surface Tension of Liquids*.

(17) The desirability of Russian participation in this program was stressed by several Members of the Task Group.

(18) This Task Group desires to express our thanks H. KIENITZ and Badische Anilin- und Soda-Fabrik AG, for the excellent hospitality we have all enjoyed during our stay in Ludwigshafen, and the good help of E. BRUNNER.

D. R. STULL

## **INORGANIC CHEMISTRY DIVISION Officers Meeting**

*Göttingen, 19 June 1970*

*Present:* Prof. O. GLEMSER, President; Prof. V. GUTTMAN, Vice-President; Prof. R. COLLONGUES, Secretary.

### *(1) Introduction*

The meeting started at 9 a.m. with an introduction by the President.

### *(2) Names of New Elements*

The President read a letter from Prof. K. A. JENSEN, Chairman of the Nomenclature Commission. Prof. JENSEN reminded the Officers of the difficulties encountered with the denomination of the 104th and 105th elements and even 102nd and 103rd.

After discussion the Officers hoped Prof. JENSEN may call together the representatives of the Institutes of Dubna and Berkeley which are the only groups working in this field. After such a meeting, recommendations for the denomination of the elements from 104 onwards, could be done.

### *(3) IUPAC Unit on Coordination Chemistry*

The President read the letter dated 13 April of the Executive Secretary of IUPAC about the relations between IUPAC and the two groups: Coordination Chemistry Conference and Organometallic Chemistry Conference.

Prof. GUTTMAN went over the historical record of this problem and said that two positions had been considered: constitution of the two groups in a IUPAC unit or independence with regard to IUPAC.

After discussion it seemed to the Division Officers that according to the Executive Committee advice, the collaboration between IUPAC and the two groups might best be achieved if these groups became Associated Organizations of IUPAC (IUPAC Statute 11). In this case the Division Officers considered that it is to be desired that both groups should be treated in the same manner by IUPAC with respect to the sponsoring of their meetings. The Officers also wished both groups to define as clearly as possible their mutual relations.

#### (4) *Review of the Work of the Commissions*

Prof. COLLONGUES set out the results of the work of the High Temperatures Commission convened in Karlsruhe on 24 April. He underlined the important work done by the Task Forces on vapour pressures and melting point standards. He also pointed out the new activities of the Commission. Finally, he called the attention of the Officers to the difficulties encountered by Mr DIAMOND (NBS) who had to stop publishing the high temperature bibliography, and pointed out how regrettable the disappearance of this publication would be.

The Division Officers wished to ask Dr HORTON, Chairman of the High Temperatures Commission, how much money this publication costs.

#### (5) *Preparation of XXVIth Conference of IUPAC: 1971 in Washington*

##### *New Members*

The Officers considered the problem of new Members to be elected next year.

##### *Schedule*

Prof. GUTTMAN noticed that the meetings of Commission II.2 (Nomenclature) to be held on 16 and 19 July are scheduled at the same time as the meetings of the Division Committee.

The President will suggest to Mr RATCLIFFE to fix the meetings of the Commission II.2:

- on 16 July from 10 a.m. to 12 a.m. (instead of 9 a.m. to 12 a.m.)
- on 19 July from 3 p.m. to 6 p.m. (instead of 2 p.m. to 6 p.m.)

in order to make possible the attendance of Prof. JENSEN, Chairman of Commission II.2, at the beginning of the meeting of the Division Committee.

##### *Reports of Commissions*

A short report will be required from the three Commission Chairmen, with a view to the meeting of the Division Presidents which will be held in Vienna next October. This report should be sent to Prof. GLEMSER before 1 August.

A more elaborate report will be requested for a meeting of the Officers and of the Chairmen of the Commissions which will take place in Paris in May 1971 (suggested date: 14 May).

The final report will be established for the Washington meeting.

#### (6) *Other business*

##### *Applied analysis*

The Division Officers read with much attention the letter sent by Prof. W. KEMULA (dated 16 December 1969) and the paper of Prof. H. MALISSA (23 February 1970). The Officers are much interested by the activities and the recommendations of the Working Group on Effectiveness of Applied Analysis. The Officers however wonder if the carrying out of the suggested program would not be, in the end, very expensive.

The President will write about this to Prof. KEMULA.



### *Travel expenses*

The President called the attention of the Officers to the letter of 2 March 1970 of Mr RATCLIFFE on the reduction of expenses for IUPAC Meetings.

The meeting closed at 1 p.m.

O. GLEMSER

## **VIIth INTERNATIONAL SYMPOSIUM ON THE CHEMISTRY OF NATURAL PRODUCTS**

*Riga, 21–27 June 1970*

The task of organizing an international symposium demands devotion, hard work and imposes physical and psychical stress upon those who are responsible for the success of such meetings. If more than one language is provided—which is a must for a truly international IUPAC Meeting—and if over and above the usual difficulties there are additional obstacles to be overcome, the normal physical capacities of a man are no longer sufficient to master all problems. Indeed we have in IUPAC more than one example where a man sacrificed his health, or even his life, due to overwork in the organization of a symposium. But we have only one striking case where the initiator and organizer of a IUPAC symposium—like a general on the battlefield—paid his devotion to international science with his own life, just before the closing session of the symposium. When in Riga—considering the tremendous efforts made by Academician M.M.SHEMYAKIN and sensing the great pain he suffered on a very hot day—I expressed my concern about the overload of work upon him, I was corrected by many young people who know him well: “SHEMYAKIN with his strong physique and his hard training will withstand every stress.” A few hours later he suddenly passed away.

Before reporting in detail on the VIIth International Symposium on the Chemistry of Natural Products it is my privilege to pay tribute to our friend and colleague Academician M.M.SHEMYAKIN who in his Plenary Lecture dedicated to chemistry quasi his heritage. Indeed “The Development of Bioorganic Chemistry in the USSR during the last Decade” is a masterpiece of scientific information, both with regard to content as well as presentation. Under the headings: “Peptides and Proteins”, “Nucleic Acids”, “Carbohydrates”, “Steroids”, “Plant Substances and Microbial Products” SHEMYAKIN gives a survey on the research made in the USSR. The bibliography with 134 references brings to general use and knowledge the tremendous amount of work done.

### *Pre-Symposia*

The USSR Organizing Committee in an extremely lucky arrangement was able to cope with all desiderata regarding big congresses on the one hand and highly specialized symposia on the other. A few days before the opening of the VIIth Symposium there were held Pre-Symposia as follows:

- (1) *Mechanism of Enzyme Catalysis*. Chairman: Prof. A.E.BRAUNSTEIN, Vice-Chairman: Prof. V.K.ANTONOV
- (2) *Transfer RNA: Structure and Functions*. Chairman: Prof. W.A.ENGELHARDT, Vice-Chairman: Prof. A.A.BAYEV



- (3) *Physicochemical Basis of Ion Transport through Biological Membranes.* Chairman: Prof. L. D. BERGELSON, Vice-Chairman: Prof. YU. A. OVCHINNIKOV
- (4) *Chemistry and Mode of Action of Antibiotics.* Chairman: Prof. A. S. КНОХЛОВ, Vice-Chairman: Prof. M. N. KOLOSOV

R. MORF

## УЧАСТНИКАМ VII МЕЖДУНАРОДНОГО СИМПОЗИУМА ПО ХИМИИ ПРИРОДНЫХ СОЕДИНЕНИЙ

От имени правительства Союза Советских Социалистических Республик сердечно приветствую участников VII Международного симпозиума по химии природных соединений, собравшихся в СССР, чтобы обсудить состояние научных исследований в этой важной области современного естествознания. Эта отрасль знания развивается во всем мире чрезвычайно интенсивно и характеризуется тесным взаимодействием ученых различных специальностей — химиков, биологов, физиков, широким использованием самых различных физических и химических методов для решения задач, стоящих перед наукой.

Выдающиеся успехи в изучении жизненных процессов, которыми ознаменовано развитие естествознания за последние десятилетия, непосредственно связаны с проблемами медицины, сельского хозяйства и промышленности, с решением многосторонних задач, способствующих прогрессу человеческого общества, улучшению здоровья, продлению жизни человека и обеспечению его необходимыми продуктами питания.

Советский Союз, в особенности в последнее десятилетие, энергично развивает научные исследования в этих направлениях.

Мы приветствуем решение Международного союза теоретической и прикладной химии о проведении этого важного форума ученых в области химии природных соединений в нашей стране.

Международное сотрудничество в исследовании физико-химических основ жизни несомненно является важным вкладом в прогресс цивилизации, в расширение взаимопонимания между народами.

Желаю всем участникам VII Международного симпозиума по химии природных соединений успехов в работе и больших творческих достижений на благо человечества.

А. КОСЫГИН,  
Председатель Совета  
Министров СССР

## IIIrd IUPAC SYMPOSIUM ON PHOTOCHEMISTRY

*St. Moritz, 12-18 July 1970*

Those who organize a congress in beautiful St. Moritz in the month of July will always arouse the suspicion that they want to secure for themselves and their colleagues a holiday combined with a spot of science. However, those who came to the

IIIrd IUPAC Symposium on Photochemistry with such expectations were positively disappointed, for such a varied and interesting program awaited them that there remained little time for additional holiday enterprises.

This Congress has once again proved that all chemical disciplines—from physical via organic, inorganic and theoretical chemistry right to biochemistry—contribute to a widening of our knowledge of the part which (visible and invisible) radiation in chemical reactions can play.

The importance of physical chemistry for the elucidation of photochemical reactions is evident and was particularly emphasized by the selection of themes of this Congress: of the eleven plenary lectures three were exclusively devoted to physicochemical problems and in all the others it also became quite clear that nobody can afford to occupy himself with photochemistry without profound spectroscopic knowledge.

(Translated from "Chemie in unserer Zeit" by courtesy of Verlag Chemie GmbH, Heidelberg. The full text will be published in German in "Blaue Blätter".)

### Report

The IIIrd IUPAC Symposium on Photochemistry was held from 12 to 18 July 1970 at the Kulm Hotel, St. Moritz, Switzerland, and was attended by 237 participants. It had originally been planned by the Organizing Committee to restrict the number of participants to 140, but because of the large number of applications received, this figure was eventually revised. The expansion in the size of the Symposium from that originally planned was made rather reluctantly in view of the fear that a larger Symposium might lead to less concentrated discussions, and also because it meant that the participants could not be all accommodated in one hotel. In the event, however, the scientific quality of the meeting appeared not to suffer as a result of the expansion in numbers, and may even have benefited from the broader spectrum of interests.

Eleven Plenary Lectures were delivered at the Symposium, and the texts of these will be published in *Pure and Applied Chemistry*. In addition, twenty-seven shorter contributed papers were presented, these being selected on the first day of the meeting from the large number of titles and abstracts which had been submitted.

Additionally, one or two informal discussion groups were arranged. One of these attempted, without any great success, to reach a common understanding about the use of the term "diradical", but nevertheless it led to a valuable exchange of ideas.

Although it had been decided not to give the Symposium any predominant theme, both inorganic photochemistry and photochromism were given particular emphasis, and distinguished contributions were received on this subject. In view of the inclusion of inorganic photochemistry, the title of the Symposium volume has been changed from "Organic Photochemistry", as in the past, to "Photochemistry".

The Organizing Committee would like to express their thanks to the financial sponsors and to the many people who in official and unofficial capacities contributed to the smooth running of the Symposium. Valuable assistance with the organization was provided, completely without charge, by the Kurverein of St. Moritz, and by Swissair.

Finally, the success of any meeting of this type depends upon the speakers. There was abundant evidence of the high quality of the lectures, for example in the very

fully attended late-night sessions. I am sure that all participants will wish to be associated with this record of our thanks to the speakers and all those who contributed to the liveliness of the discussions.

D. BRYCE-SMITH

## **COMMISSION ON HIGH TEMPERATURES AND REFRACTORIES (II.3)**

*Karlsruhe, 24 April 1970*

*Present:* Prof. O. GLEMSER, President of Division II; Dr W.S. HORTON, Chairman; Prof. G.D. RIECK, Secretary; Prof. C.B. ALCOCK; Prof. R. COLLONGUES; Prof. E. FITZER; Prof. F. CABANNES, Associate Member; Prof. K. MOTZFELDT, Associate Member; Dr D. CUBICCIOTTI, National Representative; Prof. J. DROWART, National Representative; Dr E.R. MCCARTNEY, National Representative.

*Agenda:* (1) Introduction—(2) Minutes of Previous Meeting—(3) Reports on Task Forces—(4) New Activities of the Commission—(5) Date and Place of Next Meeting.

### *(1) Introduction*

The name of the Commission was questioned because to some Members “refractories” only meant bricks and slags and other complicated oxidic materials which are not pure chemicals. This would be too narrow a field. Although the term “refractory materials” was suggested or an entirely new name—“High Temperature Chemistry”, no action was taken.

### *(3) Reports on Task Forces*

(a) *Vapour pressures*—Of the metals mentioned in the report only Pt and W have still to be investigated. Members are urged to ask scientists in their countries whether they are willing to cooperate in this research. The Commission asks the Task Force what will have been done to investigate the possibility of an alternative for Cd, which presents some problems with its vaporization coefficient. It has also been asked to look into the possibility to use oxides and salts instead of metals. Three members, ALCOCK, CUBICCIOTTI and DROWART, will look into this problem. Important points in these researches are: the container used, the species of the molecules in the gas, etc.

(b) *Melting point standards*—The question has been raised, which substances would be next on the list after alumina. Eutectics, e.g. of Mo and C, are also suitable for this purpose, and may have the advantage of being compatible with a container material. Perhaps it is possible to encourage scientists to do measurements in this field, without establishing a new task force. A query in the “Newsletter” (see below) might help.

A letter of thanks will be written by the Chairman to the Members of the Task Force.

(c) *High temperature bibliography*—It was noted with regret that Mr DIAMOND will no longer be able to contribute to and edit the bibliography. The Commission dis-



cussed alternative plans at length, because this bibliography apart from its practical use, established a strong link with the pertinent scientific community. Three possibilities have been discussed:

- Continuation through another organization like CNRS (Grenoble). The suggestion was made that bilingual key-words could be used. (ALCOCK and COLLONGUES will try to make contact.)
- try to interest a commercial journal. Especially the *Journal of Chemical Thermodynamics* has been mentioned, as it already publishes a "Bulletin". The Chairman will contact WESTRUM, an editor of this journal
- the final possibility would be to drop it, although it was felt that a specialized bibliography is very useful

The Secretary will write a letter of thanks to Mr DIAMOND for his valuable services during many years.

#### (4) *New activities of the Commission*

(a) *Ionization cross section measurements* were discussed at length. It is not clear how serious the problem of the ionization cross section is for the accuracy of the mass spectrometry measurements. It has been decided that no Task Force will be formed for this subject. The idea of composing a combined paper by about four people has been rejected in favour of the proposition that the Chairman will contact STAFFORD (North-western University) about a paper called:

"Current status of ionization cross section in mass spectrometry and high temperature chemistry"

W.S.HORTON

### **IIIrd INTERNATIONAL CONFERENCE ON ANALYTICAL CHEMISTRY**

*Budapest, 24-29 August 1970*

The Third International Conference on Analytical Chemistry, sponsored by IUPAC and by the Section of Chemical Sciences of the Hungarian Academy of Sciences was organized by the Hungarian Chemical Society from 24 to 29 August 1970 in Budapest.

IUPAC was represented by the Secretary General, Dr R. MORE, and Prof. W. KEMULA, President of the Division of Analytical Chemistry. The Conference was opened in the Ceremonial Hall of the Hungarian Academy of Sciences by Prof. G. SCHAY, President of the Hungarian Chemical Society. After a few welcoming words on the part of Prof. B. LENGYEL, President of the Chemical Sciences Section of the Hungarian Academy of Sciences, and of Prof. KEMULA, Prof. LENGYEL appreciated the merits of Prof. L. ERDEY, the recently deceased President of the Conference. Finally Prof. E. PUNGOR, the present Chairman of the Conference, spoke about recent developments in analytical chemistry in Hungary.

In the frame of the Conference 15 plenary lectures were delivered, the text of which will appear in *Pure and Applied Chemistry*. These lectures were delivered by I. P. ALIMARIN, Moscow; R. BELCHER, Birmingham; R. A. CHALMERS, Aberdeen; C.



DUVAL, Paris; T. FUJINAGA, Kyoto; G. G. GUILBAULT, New Orleans; M. JURECEK, Pardubice; W. KEMULA, Warsaw; G. MILAZZO, Rome; J. P. REDFERN, London; A. RINGBOM, Abo; J. E. SALMON, Guildford; W. SIMON, Zürich; W. W. WENDLANDT, Houston; T. S. WEST, London.

The Conference performed its work in 3 sections, which dealt with Separation Methods, Organic Analysis, and Thermal Analysis. 105 papers were delivered, and the authors represented 25 different countries. About 500 participants attended the Conference with active interest. In the frame of the section meetings often lively discussions took place.

The participants of the Conference had opportunity to become acquainted with the historic monuments of Budapest as well as with its present life.

F. SZABADVÁRY

### COMMITTEE ON TEACHING OF CHEMISTRY

A meeting of this Committee was held in Colorado (USA) on 20 July. The meeting was followed by a conference on chemical education arranged by the ACS Division of Chemical Education in celebration of its 50th anniversary.

Members who attended the IUPAC meeting were: R. W. PARRY (Chairman), D. G. CHISMAN (Secretary), J. A. CAMPBELL, R. S. NYHOLM, M. OKI, G. M. SCHWAB, P. SYKES.

J. C. BAILAR Jr, Treasurer IUPAC, R. H. MAYBURY, UNESCO, and R. L. SILBER, ACS, were also in attendance.

The following covers some of the business transacted.

The Committee received a list of Corresponding Members, numbering twenty, and the Chairman reported on the correspondence he had had with many of these Members. The possibility of bringing together the Corresponding Members as well as Titular Members at the time of the IUPAC Conference in Washington or the IUPAC Congress in July 1971 was discussed, but it was agreed that unless there were a definite subject under discussion to which the Corresponding Members could contribute it may not be desirable to bring them together. In any event, it is unlikely that financial support could be made available from IUPAC although many of the Corresponding Members could no doubt receive financial support from their own institutions or governments. In the meantime, Corresponding Members will continue to receive reports of Committee proceedings and will be encouraged to play a constructive part in the work of the Committee.

The Committee received a report from the Secretariat on the distribution of copies of the report, *Evaluation in Chemistry*, and were pleased to note that 111 copies have been sold to date. In addition, arrangements have been made with one or two organizations to take copies on a sale or return basis for distribution to members or societies.

Advance copies of the report of the Frascati Conference on University Chemical Education were available as Vol. 22 (1/2) of *Pure and Applied Chemistry*. The Committee again expressed their concern at the high price of the publication, even though

Butterworths had reported that its published price had been reduced to £3 8/- sterling. It was suggested that a copy of the report should be sent to the editor of *New Trends in Chemistry Teaching* for consideration of the possibility of reproducing a few of the articles in the next volume of *New Trends*: Mr D. G. CHISMAN to act.

The Chairman reported on the response to his letter to National Adhering Organizations drawing their attention to the Committee's recommendation, subsequently adopted by IUPAC Council, on the need to provide *in-service training of chemistry teachers* as a matter of urgency for all teachers in all countries. Particular reference was made to the progress reported by Sweden, Germany, and UK but the problems of implementing the recommendation fully are clearly very substantial. Among these problems are the economic resources of the country, the possible financial loss to the teachers, the lack of incentive (e.g. certification, increment in salary), the provision of substitute teachers. Nevertheless the Committee feels that this is a vital subject and they recommend that further information and views be obtained from the Corresponding Members. This might well give rise to further discussion and a proposal for a plan of action, possibly with UNESCO support, at the 1971 meeting. The 1971 meeting might be a suitable occasion to bring the Corresponding Members together.

Mr SILBER described the ACS short course program and illustrated the recent development of these courses in the form of films and self-study tape cassettes. Although these courses have been developed for the USA market it was noted that some will be made available, through NSF, in India. The Committee concluded that the availability of these courses should be made known to Corresponding Members and the possibility of inviting members of the Committee or Corresponding Members to review the films and tapes should be explored.

The desirability of instigating a review of new chemistry curricula and of monitoring chemistry courses and examinations was discussed. It was agreed that this was a proper activity for the Committee to sponsor. It was pointed out, however, that comparative surveys on a continental basis were already underway and that these should be studied and collated before any independent survey was launched. For instance, in Europe a survey of chemistry curricula had been carried out by Mr J. THOMPSON, the Shell Fellow at University College, London, 1969-70. In Asia a study of science education was being undertaken by Dr S. WINTER on behalf of UNESCO.

The value of an international survey of new chemistry curricula would be considerable in those countries whose courses were under revision. For this reason UNESCO might well be interested in collaboration.

A similar monitoring process for *chemistry examination papers* would be of value since a critical appraisal of examination questions was a sure way to bring about change in the teaching of chemistry.

The Committee agreed that IUPAC was an appropriate organization to act as a clearing house and to undertake a coordinating role on development in chemical education. This would mean establishing a link with national chemical education committees or the education sections of chemical societies as well as with government agencies and provide foundations concerned with chemical education projects, in addition to the existing network of national Corresponding Members (in some cases, however, the national Corresponding Members already represent chemical education

committees). The Committee therefore *recommend* to the IUPAC Executive that agencies and other national bodies should be invited to consider collaboration with the IUPAC Committee on the Teaching of Chemistry on this basis. A statement of the work of the Committee and the proposal to act in a coordinating role would be prepared for circulation to such agencies and an indication will be sought as to whether they would be willing to send representatives to a meeting to explore details in more depth.

D. G. CHISMAN

## **REPORT ON IUPAC**

*by* BYRON RIEGEL, *IUPAC Representative to ICSU AB*

The official journal of IUPAC is *Pure and Applied Chemistry* which publishes the reports of the Commissions, symposia and original articles. There are six large Divisions of IUPAC: Physical, Inorganic, Organic, Macromolecular, Analytical, and Applied Chemistry. Each of the Divisions has Commissions on nomenclature or standards of measurements. The Commission on Atomic Weights is the most famous. Another important Commission is the one on Physicochemical Symbols, Terminology and Units. The reports of these Commissions have had an international influence in standardizing the units, symbols, abbreviations and nomenclature of chemistry.

A new Inter-Divisional Committee has been appointed to study the machine documentation of chemical information and methods for standardization.

The next Conference (business meeting) of IUPAC will be held in Washington, DC (USA), 15–24 July 1971, and the next Congress will be at Boston, Massachusetts (USA) 26–31 July 1971.

## **DETAILED INFORMATION REGARDING FORTHCOMING EVENTS**

### **MACROMOLECULAR DIVISION OF IUPAC**

**Working Party on "The Relationship of Performance Characteristics to Basic Parameters of Polymers"**

*Central Laboratory T. N. O., Delft, 3–4 December 1970*

At the 17th Meeting of our Working Party held at Strasbourg on 4 March it was agreed that the 18th Meeting would be in Delft on 8 and 9 October. For several reasons it would now appear that these dates are not convenient but I have agreed with Dr HEIJBOER that Thursday and Friday, 3 and 4 December 1970 will now be the timing of the 18th Meeting at Delft.

We are suggesting that the arrangements will include starting at 16.00 hours on 3 December and finishing in the mid afternoon on 4 December. A main item of the agenda will be the LDPE rheological program coordinated by Dr MEISSNER.

J. W. BARRETT



## **SYMPOSIUM ON MAN-MADE LAKES** **Their Problems and Environmental Effects**

*Knoxville, Tennessee, 3-7 May 1971*

On behalf of International Council of Scientific Unions (ICSU). Organized by Scientific Committee on Water Research (COWAR).

### *Organizing Committee*

Prof. WILLIAM C. ACKERMANN (Chairman), President, Scientific Committee on Water Research, Box 232, Urbana, Illinois 61801 (USA); Dr E. B. WORTHINGTON, Scientific Director, International Biological Program, 7 Marylebone Road, London NW1 (UK); Dr GILBERT WHITE, Director, Institute of Behavioral Science, University of Colorado, Boulder, Colorado 80302 (USA); Mr REED A. ELLIOT, Director, Water Control Planning, Tennessee Valley Authority, Knoxville, Tennessee 37902 (USA); Prof. FLOYD C. LARSON, Director, Water Resources Research Center, University of Tennessee, Knoxville, Tennessee 37916 (USA).

### *General Statement*

The International Symposium on Man-Made Lakes—Their Problems and Environmental Effects—will focus most directly on the bodies of water created by man, their management problems, and their effects on the surrounding environment. The Symposium will be broadly interdisciplinary including the physical, life, and social sciences, engineering, and management. Specific topics are given in a subsequent section. All sessions will be plenary to promote communication among the many disciplines and skills concerned with man-made lakes. An effort will be made to assess experience in a wide range of environments and to encourage international collaboration in dealing with regional and global problems involved in the planning and management of reservoirs. The Symposium will assess recent findings, summarize knowledge, and point to needed research on man-made lakes. This will be accomplished through (1) regional summaries and discussion of the several conference topics; (2) broad, interdisciplinary case studies of the world's great man-made lakes; and (3) visits to actual projects. Only incidental attention will be given to upstream and downstream relationships. Analysis will center on the effects of the reservoirs rather than upon the primary purposes of the impoundments.

### *Papers*

Papers to be presented at the Symposium will be in part invited and in part selected from among the contributed abstracts. Papers will be presented in summarized form at the Symposium, and will be printed in full in the Proceedings to be published. Plenary sessions will be devoted to discussion of the abstracts and of the summary papers. Papers should be limited to approximately 10 pages, typewritten, double spaced, in English or French, and are to be submitted by 1 November 1970.



**IUPAC—XXIIIrd INTERNATIONAL CONGRESS  
OF PURE AND APPLIED CHEMISTRY**

*Boston, Massachusetts, 25–31 July 1971*

**Organic Chemistry Symposia**

**Symposium O-1:**

*Applications of Quantum Mechanics to Organic Chemistry*

*Chairman:* L. SALEM, Laboratory of Theoretical Chemistry, Orsay (France)

*Vice-Chairman:* L. C. ALLEN, Princeton University (USA)

M. J. S. DEWAR, University of Texas (USA): Quantitative SCF MO Studies of Reaction Mechanisms

K. FUKUI, Kyoto University (Japan): Interaction of Particular Orbitals in Chemical Reactions

R. HOFFMANN, Cornell University (USA): Orbital Symmetry Control of Organic Reaction Paths

L. C. ALLEN, Princeton University (USA): A New Conservation Law for Organic Reactions

D. T. CLARK, University of Durham (UK): A Non-empirical LCAO MO-SCF Investigation of Potential Energy Surfaces for Electrophilic Additions to Olefins

M. SIMONETTA, University of Milan (Italy): Empirical and Semiempirical Calculations for Reaction Paths

M. V. BASILEVSKY, Karpov Institute (USSR): Potential Surfaces for the Addition Reactions of  $\pi$ -Systems

J. M. LEHN, University of Strasbourg (France): *Ab initio* Conformational Analysis. Non-empirical Studies of Conformational Processes

**Symposium O-2:**

*Short Lived Intermediates*

*Chairman:* P. S. SKELL, Pennsylvania State University (USA)

D. R. WEYENBERG, Dow Corning Corp. (USA): Divalent Silicon

H. FISCHER, Eidgenössische Technische Hochschule, Zürich (Switzerland): Radical Intermediates by a New NMR Technique

C. S. FOOTE, University of California, Los Angeles (USA): Singlet Oxygen

C. W. REES, University of Leicester (UK): 1,2- and 1,3-Benzynes

U. SCHÖLLKOPF, University of Göttingen (Federal Republic of Germany)

G. L. CLOSS, University of Chicago (USA): Chemically Induced Nuclear Polarization as a Tool for the Study of Free Radical Reactions

**Symposium O-3:**

*Spectroscopy in Structure Determination*

*Chairman:* K. NAKANISHI, Columbia University (USA)

*Vice-Chairman:* F. W. McLAFFERTY, Cornell University (USA)

J. I. BRAUMAN, Stanford University (USA): Ion Cyclotron Resonance

E. HEILBRONNER, University of Basel (Switzerland): Photoelectron Spectroscopy

B. LINDBERG, Pharmacia AB (Sweden): ESCA  
F. W. McLAFFERTY, Cornell University (USA): High-Resolution Mass Spectrometry  
J. D. ROBERTS, California Institute of Technology (USA): Carbon-13 Nuclear Magnetic Resonance  
J. M. ROBERTSON, University of Glasgow (UK): X-ray Determination of Structure  
G. SNATZKE, University of Bonn (Federal Republic of Germany): Circular Dichroism  
M. TSUBOI, Tokyo University (Japan): Infrared Studies of Nucleic Acids  
R. C. LORD, Massachusetts Institute of Technology (USA): Laser Raman Spectroscopy of Biological Macromolecules

Symposium O-4:

*New Natural Product Syntheses*

In memory of M. M. SHEMYAKIN \*

Chairman: K. FOLKERS, University of Texas (USA)

D. H. R. BARTON, Imperial College (UK): Some Aspects of the Synthesis of Natural Products

G. STORK, Columbia University (USA): Total Synthesis of Pentacyclic Triterpenes

S. UMEZAWA, Keio University (Japan): Total Synthesis of Antimycin A

R. B. WOODWARD, Harvard University (USA): Recent Advances in the Chemistry of Natural Products

K. FOLKERS, University of Texas (USA)

\* Professor SHEMYAKIN of the Academy of Sciences of USSR was to have been Chairman and had organized this symposium prior to his untimely death on 26 June 1970.

Symposium O-5:

*Intramolecular Rearrangements, Valence Isomerization, and Cycloaddition*

Chairman: J. A. BERSON, Yale University (USA)

Vice-Chairman: M. R. WILLCOTT, University of Houston (USA)

R. HUISGEN, University of Munich (Federal Republic of Germany)

L. SALEM, Laboratory of Theoretical Chemistry, Orsay (France): Isomerization of Cyclopropane

J. M. CONIA, University of Paris, Orsay (France)

W. VON E. DOERING, Harvard University (USA)

J. F. M. OTH, Swiss Federal Institute of Technology (Switzerland)

H. SCHMID, University of Zürich (Switzerland)

E. VOGEL, University of Cologne (Federal Republic of Germany)

R. CRIEGEE, Technische Hochschule, Karlsruhe (Federal Republic of Germany)

Symposium O-6:

*Insect Chemistry*

Chairman: A. J. BIRCH, Australian National University (Australia)

Symposium O-7:

*General Methods of Synthesis*

Chairman: P. YATES, University of Toronto (Canada)

Vice-Chairman: P. E. EATON, University of Chicago (USA)

D. H. R. BARTON, Imperial College (UK): Some Aspects of Organic Synthesis

H. C. BROWN, Purdue University (USA): New Developments in the Organoboranes

- E.J. COREY, Harvard University (USA): General Methods for the Construction of Complex Molecules
- A. ESCHENMOSER, Eidgenössische Technische Hochschule, Zürich (Switzerland): Studies on Organic Synthesis
- K. HAFNER, Technische Hochschule Darmstadt (Federal Republic of Germany): Syntheses of Cross-conjugated Carbon and Heterocyclic  $\pi$ -Electron Systems
- J. TSUJI, Toray Industries, Inc. (Japan): Organic Syntheses by Means of Transition Metal Complexes

Symposium O-8:

*Organo-Transition Metal Chemistry*

*Chairman:* R. S. NYHOLM, University College (UK)

*Vice-Chairman:* J. LEWIS, University of Cambridge (UK)

F.A. COTTON, Massachusetts Institute of Technology (USA): Unusual Structures and Unimolecular Structural Rearrangements in Metal-Polyolefin Complexes

R. MASON, University of Sheffield (UK): Chemical Bond in Organo-Transition Metal Compounds: Some Recent Developments

R. S. NYHOLM, University College (UK)

A. W. JOHNSON, University of Sussex (UK)

D. SEYFERTH, Massachusetts Institute of Technology (USA)

G. KREITER, Technische Hochschule, München (Federal Republic of Germany)

Symposium O-9:

*Photochemistry*

*Chairman:* E. HAVINGA, State University of Leiden (Netherlands)

O. L. CHAPMAN, Iowa State University (USA)

P. DE MAYO, University of Western Ontario (Canada)

J. RIGAUDY, Ecole supérieure de Physique et de Chimie industrielles de la Ville de Paris (France)

K. SCHAFFNER, Eidgenössische Technische Hochschule, Zürich (Switzerland)

Symposium O-10:

*Medicinal Chemistry*

*Chairman:* B. M. BLOOM, Chas. Pfizer & Co., Inc. (USA)

H. G. KHORANA, Massachusetts Institute of Technology (USA): Polynucleotide Synthesis

C. DJERASSI, Stanford University (USA): Fertility Control

J. P. CHANGEUX, Pasteur Institute (France): Molecular Aspects of Biological Membranes

K. HEUSLER, CIBA Ltd. (Switzerland): Cephalosporin Penicillin Research

W. WECHTER, Upjohn Co. (USA): Immunosuppressant Drugs

Symposium O-11:

*Free Radicals and Homolytic Mechanisms*

*Chairman:* M. JULIA, University of Paris (France)

*Vice-Chairman:* J. K. KOCHI, Indiana University (USA)

J. K. KOCHI, Indiana University (USA): Redox Mechanisms of Free Radicals and Metal Complexes

- C. RÜCHARDT, University of Münster (Federal Republic of Germany): Structure Reactivity-Relations in the Chemistry of Aliphatic Free Radicals  
 W.A. WATERS, Oxford University (UK): Role of Free Radicals in Oxidation and Reduction  
 G.S. HAMMOND, California Institute of Technology (USA): Medium Effects on Radical-Radical Reactions  
 P.D. BARTLETT, Harvard University (USA): Aspects of Radical Pairs and Biradicals

Symposium O-12:

*Small Rings*

- Chairman:* E. SCHMITZ, German Academy of Sciences, Berlin-Adlershof (Democratic Republic of Germany)  
*Vice-Chairman:* W. LWOWSKI, New Mexico State University (USA)  
 R. HOFFMANN, Cornell University (USA): Intermediates and Transition States for the Fragmentation of Small Rings  
 R. KOSTIKOV, State University of Leningrad (USSR): Carbocyclic Three-membered Rings Containing *Endo*- and *Exo*-Double Bonds  
 F.D. GREENE, II, Massachusetts Institute of Technology (USA): Ring-Chain-Isomerism in Small Ring Heterocycles  
 H. ULRICH, Upjohn Co. (USA): Heterocyclic Four-membered rings *via* Polar Cycloaddition Reactions of Heterocumulenes  
 P. BORREVANG, NOVO Terapeutisk Laboratorium (Denmark): Biologically Active Diaziridines and Diazirine Compounds  
 A. MANNSCHRECK, University of Heidelberg (Federal Republic of Germany): The Invertomers of Diaziridines and Oxaziridines  
 E. SCHMITZ, German Academy of Science, Berlin-Adlershof (Democratic Republic of Germany): Some Unusual Reactions of Three-membered Rings  
 A.M. TROZZOLO, Bell Telephone Labs., Inc. (USA): Low Temperature Photochemistry of Three-membered Heterocycles

Symposium O-13:

*Biosynthesis*

- Chairman:* D. ARIGONI, Eidgenössische Technische Hochschule, Zürich (Switzerland)  
*Vice-Chairman:* A.I. SCOTT, Yale University (USA)  
 A.R. BATTERSBY, University of Cambridge (UK)  
 A.I. SCOTT, Yale University (USA)  
 I.D. SPENSER, McMaster University (Canada)  
 J.L. STROMINGER, Harvard University (USA)  
 C. TAMM, University of Basel (Switzerland)

**Macromolecular Chemistry Symposia**

Symposium M-1:

*Dynamics of Conformational Change in Macromolecules*

- Chairman:* G. ALLEN, University of Manchester (UK)  
*Vice-Chairman:* D. M. CROTHERS, Yale University (USA)  
 W.H. STOCKMAYER, Dartmouth College (USA): Conformations and Contortions  
 B.H. ZIMM, University of California, San Diego (USA): Unwinding of DNA



G. SCHWARZ, University of Basel (Switzerland): Theory of Cooperative Kinetics on a Linear Lattice

G. B. BENEDEK, Massachusetts Institute of Technology (USA): Measurements of Diffusion Constants from the Spectrum of Light Scattering by Solutions of Macromolecules

S. CLAESSON, University of Uppsala (Sweden): Conformation Rate Studies by Light Scattering and Fluorescence from Solution

P. A. EGELSTAFF, Atomic Energy Res. Establishment, UK Atomic Energy Authority (UK): Dynamics of Macromolecules: Studies by Neutron Scattering

#### Symposium M-2:

##### *Photochemistry of Macromolecules*

*Chairman:* J. E. GUILLET, University of Toronto (Canada)

*Vice-Chairman:* F. H. WINSLOW, Bell Telephone Labs., Inc. (USA)

F. W. J. TEALE, University of Birmingham (UK): Studies of Protein Photochemistry

G. GEUSKENS, Free University of Brussels (Belgium): Energy Transfer and Migration in Polymers

J. E. GUILLET, University of Toronto (Canada): Photochemistry in Macromolecular Systems

H. E. JOHNS, University of Toronto (Canada): Photochemistry of Excited States of Nucleic Acid Components

A. A. LAMOLA, Bell Telephone Labs., Inc. (USA): Paths of Relaxation of Electronically Excited Nucleic Acids

J. L. R. WILLIAMS, Eastman Kodak Co. (USA): Synthesis and Properties of Photo-reactive Polymers

#### Symposium M-3:

##### *New Developments in Ionic Polymerization*

*Chairman:* D. C. PEPPER, University of Dublin, Trinity College (Ireland)

*Vice-Chairman:* J. BOOR, Jr., Shell Chemical Co. (USA)

D. C. PEPPER, University of Dublin (Ireland): Fast-initiated Cationic Polymerizations

J. P. KENNEDY, University of Akron (USA): Novel Graft Copolymers by Carbonium Ion Mechanisms

A. LEDWITH, University of Liverpool (UK): Cation Radicals in Reactions of Olefins

J. BOOR, Jr., Shell Chemical Co. (USA): Mechanisms of Ziegler-type Catalyses

M. MORTON, Institute of Polymer Science, University of Akron (USA): Mechanism of Organo-Lithium Polymerization of Diolefins

E. J. VANDENBERG, Hercules Inc. (USA): Recent Developments in Ring-opening Polymerizations

P. TEYSSIE, University of Liège (Belgium):  $\pi$ -Allyl Polymerization of Diolefins

A. ZAMBELLI, Politecnico (Italy): Syndiotactic Polypropylene

#### Symposium M-4:

##### *Electrical and Optical Properties of Polymers*

*Chairman:* H. C. BENOIT, Centre de Recherches sur les Macromolécules, Strasbourg (France)—*Vice-Chairman:* I. TINOCO, University of California, Berkeley (USA)

M. HANSS, Laboratoire de Chimie macromoléculaire et de Biophysique, Lyon (France): Kerr Effect in Biological Polymers

- M. KRYSZEWSKI, Polytechnic Institute, Lodz (Poland): Electrical Properties of Polymers in Bulk
- W. L. PETICOLAS, University of Oregon (USA): Raman Scattering from Biological Polymers
- W. PRINS, Syracuse University (USA): Rheo-optics of Polymer Gels
- R. S. STEIN, University of Massachusetts (USA): Optical Properties of Bulk Polymers
- L. STRYER, Yale University (USA): Fluorescence Studies on Biological Macromolecules

Symposium M-5:

*New Developments in Free Radical Polymerization*

*Chairman:* V. A. KABANOV, Moscow State University (USSR)

*Vice-Chairman:* C. T. WALLING, University of Utah (USA)

- N. G. GAYLORD, Gaylord Association Inc. (USA): Role of Matrices in Polymerization of Comonomer Charge Transfer Complexes
- C. H. BAMFORD, University of Liverpool (UK)
- M. HIROOKA, Sumitomo Chemical Co., Ltd. (Japan): Alternating Copolymerization via Complexed Vinyl Monomers
- F. TÜDÖS, Hungarian Academy of Sciences (Hungary): Some Problems of Complexation in Radical Polymerization
- V. P. ZUBOV, Moscow State University (USSR): Polymerization and Copolymerization in the Presence of Complexing Agents

Symposium M-6:

*Membranes—Structure and Transport*

*Chairman:* E. RACKER, Cornell University (USA)

*Vice-Chairman:* L. L. M. VAN DEENEN, State University of Utrecht (Netherlands)

- M. EIGEN, Max-Planck-Institute for Physical Chemistry, Göttingen (Federal Republic of Germany): Physical Chemical Properties of Membranes
- P. MUELLER, Eastern Pennsylvania Psychiatric Institute (USA): Model Membranes
- E. P. KENNEDY, Harvard University Medical School (USA): Membrane Proteins Involved in Transport
- P. MITCHELL, Glynn Research Laboratory (UK): Chemiosmotic Hypothesis of Membrane Function
- L. L. M. VAN DEENEN, State University of Utrecht (Netherlands): Role of Phospholipids in Membranes
- E. RACKER, Cornell University (USA): Reconstitution of a Membrane
- E. KATCHALSKI, Weizmann Institute of Science (Israel)

Symposium M-7:

*Reactions and Modifications of Polymers*

*Chairman:* H. J. HARWOOD, Institute of Polymer Science, University of Akron (USA)

*Vice-Chairman:* N. A. PLATÉ, Moscow State University (USSR)

- C. P. PINAZZI, University of Caen (France): Carbenation and Alkylboration of Polydienes

- H. MORAWETZ, Polytechnic Institute of Brooklyn (USA): Physical Properties of Chain Molecules as Reflected in Their Chemical Reactivity
- N. A. PLATÉ, Moscow State University (USSR): Problems Concerning the General Theory of Macromolecular Reactivity
- E. KLESER, University of Freiburg (Federal Republic of Germany): Influence of Reaction Conditions on the Structure of Partially Hydrolyzed Poly(methyl methacrylate)

Symposium M-8:

*Heterophase Polymer Systems*

- Chairman:* D. J. MEIER, Shell Chemical Co. (USA)
- Vice-Chairman:* J. F. HENDERSON, Polymer Corp., Ltd. (Canada)
- G. RIESS, Ecole supérieure de Chimie de Mulhouse (France)
- D. MCINTYRE, Institute of Polymer Science, University of Akron (USA): Thermodynamic and Morphological Parameters in Triblock Polymers
- M. MATSUO, Japanese Geon Co., Ltd. (Japan): Fracture Mechanisms of Rubber-Toughened Plastics
- R. T. LAFLAIR, Polymer Corp., Ltd., Sarnia, Ontario (Canada): Structure, Morphology and Properties of Block Copolymers
- M. MORTON, Institute of Polymer Science, University of Akron (USA): Factors Governing the Elastomeric Properties of A-B-A Block Polymers

Symposium M-9:

*Medical Polymers*

- Chairman:* D. LIM, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Prague (Czechoslovakia)
- Vice-Chairman:* F. LEONARD, Walter Reed Army Medical Center (USA)
- D. J. LYMAN, University of Utah (USA): Molecular Interactions Occurring at the Polymer-Living System Interface
- O. WICHTERLE, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Prague (Czechoslovakia): Recent Advances in Synthesis of Materials for Construction of Artificial Organs
- C. SCHUERCH, State University of New York College of Forestry (USA): Synthesis and Pharmaceutical Applications of Polysaccharides
- C. G. OVERBERGER, University of Michigan (USA): Catalysis of Ester Hydrolysis by Synthetic Macromolecules—A Comparison with Natural Enzymes
- H. THIELE, University of Kiel (Federal Republic of Germany): Histolysis and Histogenesis

Symposium M-10:

*Polymerization and Copolymerization of Heterocyclics*

- Chairman:* J. FURUKAWA, Kyoto University (Japan)
- Vice-Chairman:* O. VOGL, University of Massachusetts (USA)
- T. SAEGUSA, Kyoto University (Japan): Polymerization of Cyclic Ethers
- H. S. ELEUTERIO, E. I. du Pont de Nemours & Co., Inc. (USA): Polymerization of Perfluoroepoxides



- N.S. ENIKOLOPYAN, Institute of Chemical Physics, Academy of Sciences of USSR (USSR): Kinetics and Mechanism of Polymerization of Oxygen Heterocyclics
- H. CHERDRON, Farbwerke Hoechst AG (Federal Republic of Germany): New Trioxane Copolymers
- G. L. BRODE, Union Carbide Corpn. (USA): Lactone Polymers
- J. ŠEBENDA, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Prague (Czechoslovakia): Lactam Polymers

#### Symposium M-11:

##### *Olefin Copolymers*

*Chairman:* W. COOPER, Dunlop Research Centre (UK)

*Vice-Chairman:* F. C. FOSTER, Chemplex Co. (USA)

- J. FURUKAWA, Kyoto University (Japan): Alternate Copolymerization of Butadiene and Propylene
- J. P. HOGAN, Phillips Petroleum Co. (USA): Ethylene-Alpha Olefin Copolymers made by the Phillips Process
- E. K. EASTERBROOK, Uniroyal Chemical Co. (USA): Discussion of Some Polymerization Parameters in the Synthesis of EPDM Elastomers
- G. MAZZANTI, Montecatini Edison SpA (Italy): Relationship between the Structure of Ethylene-Propylene Copolymers and Physical, Physico-Mechanical Properties of Elastomeric and Plastomeric Material Derived from Them
- E. W. DUCK, International Synthetic Rubber Co., Ltd. (UK), and W. COOPER, Dunlop Research Centre (UK): Recent Developments in the Synthesis of EPDM Elastomers
- F. ENGEL, Chemische Werke Hüls, AG (Federal Republic of Germany)

#### Symposium M-12:

##### *Developments in Polymer Morphology*

*Chairman:* E. W. FISCHER, University of Mainz (Federal Republic of Germany)

*Vice-Chairman:* F. PRICE, University of Massachusetts (USA)

- A. KELLER, University of Bristol (UK): Some Recent Developments in the Study of Polymer Crystals
- L. MANDELKERN, Florida State University (USA): Relation between Thermodynamic and Morphological Properties of Bulk and Solution Crystallized Polymers
- W. PECHHOLD, Technische Hochschule Stuttgart (Federal Republic of Germany): Effect of Rotational Isomerism on Molecular Order and Mobility in Solid Polymers
- A. PETERLIN, Camille Dreyfus Lab., Research Triangle Institute (USA): Morphology of Oriented Crystalline Polymers
- R. E. ROBERTSON, General Electric Research and Development Centre (USA): Macroscopic Kinking in Deformation of Polymers
- R. BONART, Farbenfabriken Bayer AG (Federal Republic of Germany): Supermolecular Structures of Amorphous Two-phase Systems



Symposium M-13:

*Interface and Adhesion Problems in Polymer Composites*

*Chairman:* J. B. DONNET, Ecole supérieure de Chimie de Mulhouse (France)

*Vice-Chairman:* A. N. GENT, University of Akron (USA)

E. A. DiMARZIO, National Bureau of Standards (USA)

D. H. KAELBLE, North American Rockwell Research Center (USA)

F. J. MCGARRY, Massachusetts Institute of Technology (USA)

W. C. WAKE, City University, London (UK)

J. W. HERRICK, AVCO Corp. (USA)

W. A. WEYL, Pennsylvania State University (USA)

Symposium M-14:

*New Monomers and Polymers*

*Chairman:* W. KERN, University of Mainz (Federal Republic of Germany)

*Vice-Chairman:* J. K. STILLE, University of Iowa (USA)

C. G. OVERBERGER, University of Michigan (USA): Some New Asymmetric Polymers and Their Optical Properties in Solution

G. DALL'ASTA, Montecatini Edison SpA (Italy): Studies on the Mechanism of the Ring-opening Polymerization of Cycloolefins with Particular Reference to Cycloolefin Copolymerizations

E. A. OFSTEAD and N. CALDERON, Goodyear Tire & Rubber Co. (USA): Ring-opening Polymerization of Multicyclic Unsaturated Monomers by the Olefin Metathesis Reaction

G. WEGNER, University of Mainz (Federal Republic of Germany): Topochemical Polymerization of Monomers with Conjugated Triple-Bonds

G. MANECKE, Free University of Berlin (Federal Republic of Germany): Redox Systems with Sulfon- and Sulfonamide Bridges

J. K. STILLE, University of Iowa (USA): Cycloaddition Polymerization

**Joint Symposia**

Symposium J-1:

*Homogeneous Catalysis*

*Chairman:* G. WILKE, Max Planck Institute for Coal Research, Mülheim-Ruhr (Federal Republic of Germany)—*Vice-Chairman:* R. F. HECK, Hercules Inc. (USA)

N. CALDERON, Goodyear Tire and Rubber Co. (USA): Metathesis of Olefins by Homogeneous Catalysts

G. P. CHIUSOLI, Montecatini Edison SpA (Italy): Catalysis of Some Insertion Reactions by Nickel Complexes

- A. MIYAKE, Toray Industries Inc. (Japan): Catalytic Formation of Macrocyclic Polyenes from Butadiene
- D. G. H. BALLARD, Imperial Chemical Industries Ltd. (England): Polymerization with Homogeneous Transition Metal Catalysts
- H. BÖNNEMANN, Max Planck Institute for Coal Research, Mülheim-Ruhr (Federal Republic of Germany): Homogeneous Reactions Catalysed by Group VIII Metal Systems

#### Symposium J-2:

##### *Mechanism of Enzyme Action*

*Chairman:* D. E. KOSHLAND, Jr., University of California, Berkeley (USA)

*Vice-Chairman:* D. C. PHILLIPS, Oxford University (UK)

D. C. PHILLIPS, Oxford University (UK): X-Ray Structure of Active Sites

B. G. MALSTROM, University of Göteborg (Sweden): Structure and Function of Carbonic Anhydrase

J. DRENTH, Rijksuniversiteit Groningen (Netherlands): Structure and Function of Papain

F. H. WESTHEIMER, Harvard University (USA): Mechanisms of Enzymatic Decarboxylations and Decarboxylations

R. H. ABELES, Brandeis University (USA): Rearrangements Catalyzed by Enzymes

M. A. RAFTERY, California Institute of Technology (USA): NMR in the Study of Enzyme Complexes

H. THEORELL, Medicinska Nobelinstitutet (Sweden): Mechanism of Action of Alcohol Dehydrogenase

M. EIGEN, Max Planck Institute for Physical Chemistry, Göttingen (Federal Republic of Germany): Fast Reactions in Catalysis

F. RICHARDS, Yale University (USA): Structure and Function of Ribonuclease

#### Symposium J-3:

##### *Advances in Conformational Analysis*

*Chairman:* P. PINO, Eidgenössische Technische Hochschule, Zürich (Switzerland)

*Vice-Chairman:* E. L. ELIEL, University of Notre Dame (USA)

D. H. R. BARTON, Imperial College (UK): Introduction

S. LIFSON, Weizmann Institute of Science (Israel): Use of Semiempirical Calculations in Conformational Analysis of Small and Large Molecules

P. CORRADINI, University of Naples (Italy): Use of X-Ray Techniques in Conformational Analysis

F. A. BOVEY, Bell Telephone Laboratories Inc. (USA): Investigation of Conformational Equilibria in Small and Large Molecules by NMR Spectroscopy

M. GOODMAN, Polytechnic Institute of Brooklyn (USA): Aspects of the Conformational Analysis of Synthetic High Polymers

E. L. ELIEL, University of Notre Dame (USA): Aspects of Conformational Analysis of Small Molecules

Symposium J-4:  
*Ion Pair Processes*

*Chairman:* M. SZWARC, State University of New York College of Forestry (USA)

*Vice-Chairman:* S. BYWATER, National Research Council of Canada (Canada)

G. J. SMETS, Catholic University of Louvain (Belgium): End Group Association and Complexation in Anionic Polymerization

V. A. KABANOV, Moscow State University (USSR): Ion Pairs at Polymerizations in Aqueous Solutions

N. M. ATHERTON, University of Sheffield (UK): Recent Magnetic Resonance Studies of Ion Pairs

E. DE BOER, University of Nijmegen (Netherlands): Ion Pairs of Triplets and Related Problems

P. SIGWALT, University of Paris (France): Direct and Indirect Evidence of Monomer Solvation of Ionic Species in Polymerization Reactions

M. SZWARC, State University of New York College of Forestry (USA): Concept of Ion Pairs and their Behavior in Chemical Reactions

H. STREHLOW, Max Planck Institute for Electrochemistry, Göttingen (Federal Republic of Germany): Ion Pairs—Relaxation Processes and Structure

Symposium J-5:  
*Synthesis and Conformation of Biopolymers*

*Chairman:* E. KATCHALSKI, Weizmann Institute of Science (Israel)

*Vice-Chairman:* R. B. MERRIFIELD, Rockefeller University (USA)

C. B. ANFINSEN, National Institutes of Health (USA)

H. A. SCHERAGA, Cornell University (USA)

S. LIFSON, Weizmann Institute of Science (Israel)

R. B. MERRIFIELD, Rockefeller University (USA)

**Contributed Papers**

(1) *Subject Areas*

The Program Committee will consider papers contributed by Members of the Congress in 19 subject areas for Macromolecular Chemistry identical with the Macromolecular and Joint Symposia subjects previously listed, and in 10 subject areas for the Organic Chemistry identified as follows:

O-C-1 Medicinal Chemistry

O-C-2 Applications of Theory and Quantum Mechanics

O-C-3 Enzymes, Nucleic Acids, and other Biopolymers

O-C-4 Intramolecular Rearrangements, Valence Isomerization, and Cycloaddition

O-C-5 Determination of Structure and Conformation

O-C-6 Organo-Inorganic Chemistry



O-C-7 Ionic Processes

O-C-8 Radicals, Carbenes, and Other Short-lived Intermediates

O-C-9 Synthetic Organic Chemistry

O-C-10 Photochemistry

## (2) *Submission of Abstracts and Papers*

Deadline for receipt at the Congress Secretariat in Washington, DC (USA): *No later than 1 January 1971.*

Each registered Member wishing to contribute a paper should submit an abstract of approximately 200 words to be typed on Form C supplied with Circular II. Directions on the form should be followed with care, since the booklets containing the abstracts are to be prepared by photo reproduction. Abstracts will be published in the language in which they are submitted, but English is preferred.

In addition, a copy of the paper itself, or a long abstract (1000 words or more) containing a detailed description of the work on which the conclusions are based, should be submitted with the 200-word abstract. Depending on whether the paper is submitted for the Organic Chemistry Section or the Macromolecular Chemistry Section, the following conditions should be noted:

*The Organic Chemistry Section* will schedule contributed papers for presentation in sessions devoted to each of the 10 subject areas previously listed. These sessions will be concurrent with the Symposia. Authors will be allotted ten minutes for presentation and five minutes for discussion. It is anticipated that more papers acceptable for the program will be submitted than can be scheduled for formal presentation in the time available. Accordingly, for each subject area a room will be designated where authors and their colleagues can meet for informal discussion, particularly of those papers accepted for the program but not scheduled for formal presentation. For papers submitted for consideration in the Organic Chemistry Section, the copy of the paper itself, or a long abstract, is needed to assist reviewers in selection for the program. These will not be reproduced nor will they be returned to the author. The 200-word abstracts of all papers accepted will appear in the printed booklet of abstracts provided to each registered Member.

*The Macromolecular Chemistry Section* will not schedule contributed papers for formal presentation. Instead, those contributed papers that are accepted for the Congress will be listed for discussion in informal sessions. Each informal session will be held in conjunction with the corresponding formal symposium, and during a period of the day when the formal symposium is recessed.

Contributed papers will be listed in the program and will be published in a booklet of preprints. Authors are required to attend the session to which their papers are assigned in order that they shall be available for discussions of their papers, as set forth in the preprints, with interested participants at the Congress. Contributors to the Macromolecular Chemistry Section accordingly are required to submit, in addition to the 200-word abstract (typed on Form C), a more comprehensive report of their contribution prepared in a form suitable for publication in the preprint booklet by photographic reproduction. Special paper should be requested in advance from the Secretariat for this purpose. A maximum of 8 pages including tables and figures will be allowed. Authors should follow carefully the detailed instructions that will be sent to them with the special paper.



### (3) *Acceptance and Scheduling*

Authors whose papers are accepted for the Congress will be notified of the date and scheduled time of presentation or discussion about six weeks after the 1 January 1971 deadline. Authors should not ask for a specific time for presentation. If some circumstance makes attendance for certain specific days impossible, the Secretariat in Washington, DC, should be advised of this *no later than 1 January 1971*.

If a paper is not accepted, the author will be notified. Copies of his abstract and paper will not be returned unless requested.

### (4) *Visual Aids*

The lecture rooms where formal presentations of contributed papers in the Organic Chemistry Section are assigned will be equipped with the usual projection facilities for slides. Time allotted for oral presentation and questions is only 15 minutes for each paper, and it is suggested that no more than ten slides be used. Discussion rooms for other contributed papers, including all those in the Macromolecular Chemistry Section, will be equipped with blackboards only, with no provision for projection of slides.

### (5) *Publication Restrictions*

A paper accepted for the Congress should not appear in a journal or other publication beforehand. If the paper has been submitted for publication previously, the author should request the editor to schedule publication after the Congress.

Formal publication of contributed papers will not be undertaken by the Congress. The abstracts required of all authors and the preprints required of papers in the Macromolecular Section should serve the purpose of advance announcement of the author's recent results. Authors of contributed papers may publish their work in greater detail as they wish through normal channels of publication.

### (6) *Language*

The Congress will be conducted in English. It is hoped that abstracts and preprints will be submitted in English, but they will be published in the language in which they are submitted.

Papers may be presented in any language, but the Organizing Committee recommends that speakers use English if possible. It will not be possible to have simultaneous translations.

Multilingual Congress personnel will be at Logan International Airport and the Congress Hospitality Center in the Constitution Room of the Sheraton-Boston Hotel to assist visitors from abroad with interpretation.

## **IIIrd SAC CONFERENCE**

*Durham, 12-16 July 1971*

The Third SAC Conference, organized by the Society of Analytical Chemistry, will be held at the University of Durham (UK), from 12 to 16 July 1971 and will be sponsored by IUPAC.

### *Conference Themes*

The principal themes of the Conference will be devoted to Automatic Methods, Electroanalytical Methods, Chemical Methods, Molecular and Nuclear Spectroscopy, Gas Chromatography, Thin Layer Chromatography and Electrophoresis. The program will include visits to industry and other places of interest. An exhibition of laboratory apparatus will also be arranged.

### *Accommodation*

Accommodation during the Conference will be provided in two of the modern Halls of Residence of the University. The charge will be £15 per person for 5 days or £17 for 6 days.

If you wish to be kept informed of arrangements, and to receive Application Forms when available, please write to:

Mr F. C. SHENTON, County Analyst's Department, County Hall, Durham (UK).

## **INTERNATIONAL SYMPOSIUM ON CHEMICAL EDUCATION**

*São Paulo, 30 August–3 September 1971*

An International Symposium on Chemical Education will take place at the "Cidade Universitária" of the University of São Paulo (Brazil) on 30 August to 3 September 1971.

The main purpose of the Symposium will be to discuss problems related to the teaching of chemistry in the gap between the end of high-school and the beginning of university, by considering especially the Latin American situation. The following topics are being considered:

- (1) The articulation of chemical education between high-school and first year university
- (2) The formation and actualization of teachers for high-school (curricula and summer courses)
- (3) Function of the university in the orientation of teachers for high-schools and planning of new teaching methods
- (4) Basic courses in chemistry (mainly first year university) for *large numbers* of students and related problems, as teaching methods, process of evaluation, etc.
- (5) Entrance examination for the university: methods of selection when dealing with large numbers of candidates

The Organizing Committee consists of:

O. T. BENFEY, Earlham College, Richmond, Indiana (USA)

E. GIESBRECHT, Universidade de São Paulo, São Paulo (Brazil), Chairman

ARIEL H. GUERRERO, Universidad de Buenos Aires, Buenos Aires (Argentina)

H. FRANK HALLIWELL, University of East Anglia, Norwich (England)

JOSÉ GÓMEZ-IBÁÑEZ, Wesleyan University, Middletown, Connecticut (USA)

MANUEL MADRAZO GARAMENDI, universidad Nacional Autónoma, México, D.F.  
(Mexico)

SIMÃO MATHIAS, Universidade de São Paulo, São Paulo (Brazil)

The Symposium is sponsored by the University of São Paulo, Brazilian Academy of Sciences, and IUPAC. Other organizations are expected to support the meeting.

Main lectures will be delivered by specially invited educators, as well as papers on the listed subjects. The languages to be used at the meeting are English, French, and German.

All correspondence should be mailed to the following address: E. GIESBRECHT, Instituto de Química, Universidade de São Paulo, Caixa Postal 8105, São Paulo, SP (Brazil).

### **IUPAC INTERNATIONAL CONGRESS ON ANALYTICAL CHEMISTRY**

*Kyoto, 3-7 April 1972*

The Japan Society for Analytical Chemistry will hold at the Kyoto International Conference Hall an International Congress on Analytical Chemistry, under the sponsorship of IUPAC and the Science Council of Japan.

Post-Congress Symposia are to be held in succession to the Congress at several cities throughout Japan.

#### *Scientific Program*

The scientific program will cover most areas of analytical chemistry, and will include (A) electrochemical analysis, (B) spectrometric analysis, (C) radiochemical analysis, (D) chromatography, (E) organic analysis, and (F) miscellaneous methods. Special emphasis will be given to trace analysis and the use of non-aqueous solvents.

#### *Plenary Lectures*

Plenary and section lectures, about ten in all, will be delivered by the invited speakers, and each will last about one hour.

All correspondence should be addressed to Prof. TAITIRO FUJINAGA, Organizing Committee, International Congress on Analytical Chemistry, International Conference Hall, Takaraike, Sakyo-ku, Kyoto (Japan).

### **CONFERENCE ON ANALYTICAL CHEMISTRY**

*Braşov, 22-26 September 1971*

The Chemical Section of National Council of Engineers and Technicians in Romania (CNIT) organizes the IIIrd Conference on Analytical Chemistry in Braşov between 22 and 26 September 1971 with the following sections:

(1) *Electrometric methods*—(2) *Optical methods*—(3) *Separation methods*

Final acceptance of the papers will be based on the full texts received by 15 March 1971.

Secretariat of the Organizing Committee: Dr C. LUCA, National Council of Engineers and Technicians, Calea Victoriei 118, Bucharest (Romania).



## MISCELLANEOUS PUBLICATIONS

### ICSU PUBLICATIONS

The ICSU Abstracting Board announces the publication of:

*Survey of the Activities of the ICSU Scientific Unions, Special and Scientific Committees and Commissions of ICSU in the Field of Scientific Information during the Year 1969* (May 1970, 365 pp. Tables, Price US\$ 12 plus mailing charges).

This report describes briefly the activities of ICSU Bodies in the field of scientific information.

It is published regularly each year since 1965.

More than 170 Commissions or Committees are listed; for each of them general information is given (name of the Commission, Chairman, Secretary, periodicity of meetings, etc.) as well as general description of the activities of the Commission and a summary of its activities during the year 1969.

The ICSU Abstracting Board announces further the publication of:

*Tentative List of Publications of ICSU Scientific Unions, Special and Scientific Committees and Commissions of ICSU, Year 1969, and Corrections and Additions to the 1968 List* (May 1970, 44 pp. Price US\$ 5 plus mailing charges).

These publications are now on sale and may be obtained from the ICSU AB Secretariat, 17 rue Mirabeau, F-75 Paris 16<sup>e</sup> (France).

### MANUAL OF SYMBOLS AND TERMINOLOGY FOR PHYSICOCHEMICAL QUANTITIES AND UNITS

The general responsibilities of the IUPAC Commission on Symbols, Terminology, and Units (I.1) are to secure clarity and precision, and wider agreement in the use of symbols, by chemists in different countries, among physicists, chemists, and engineers, and by editors of scientific journals. In pursuing these aims, liaison is maintained with other international organizations and in particular with the Commission on Symbols, Units, and Nomenclature of the International Union of Pure and Applied Physics (SUN Commission) and Technical Committee 12 of the International Organization for Standardization (ISO/TC 12).

Following its adoption by the IUPAC Council at Cortina d'Ampezzo in 1969, Commission I.1 has now published its new *Manual on Symbols and Terminology for Physicochemical Quantities and Units in Pure and Applied Chemistry*, **21** (1), 1-44 (1970). The recommendations presented are generally in agreement with those of the SUN Commission and ISO/TC 12. The present publication supersedes the Commission's publication of 1959 in English and French and its translations into other languages.



As the "Green Book" of definitive IUPAC nomenclature rules for physical chemistry, the *Manual* will find its place on the shelves of teachers, authors and editors, next to the "Red Book" and the "Blue Books" of IUPAC nomenclature rules for inorganic and for organic chemistry. It includes recommendations about the names and symbols for physicochemical quantities; a full account of the International System of Units (SI) and of other units; recommendations about numbers and about the algebraic relation of physical quantity, unit, and number; and a list of recommended mathematical symbols. Short chapters are devoted to symbols for chemical elements, nuclides, and particles; symbols for spectroscopy; conventions relating to galvanic cells; pH; and symbols and terminology for rates of reaction. A list of the recommended values of the fundamental constants is given. The body of the *Manual* is expected to stand for at least ten years. It is planned, however, to attach to it from time to time Appendices on symbols and terminology for more specialized fields of physical chemistry. The first of these—on activities and related quantities—is included in the present volume.

Copies of the *Manual* are available, at a price of £1/\$3.00, from Butterworths, 88 Kingsway, London WC2, UK.

M. L. McGLASHAN

## IUPAC-SPONSORED MEETINGS

1970

October 12-17	International Conference on Chemical Pollution and Human Ecology (Human Ecology Conference, c/o Institute of Industrial Hygiene and Occupational Diseases, Šrobárova 48, Praha 10, Czechoslovakia)	Prague (Czechoslovakia)
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November 2-6	International Congress on Industrial Waste Water (International Congress on Industrial Waste Water, Drottning Kristinas väg 47D, S-114 28 Stockholm, Sweden)	Stockholm (Sweden)
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1971

February 17-19	International Symposium on Pesticide Terminal Residues (Organizing Committee, IInd International Congress of Pesticide Chemistry, POB 16271, Tel Aviv, Israel)	Tel Aviv (Israel)
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February 21-26	IInd International Congress of Pesticide Chemistry (Organizing Committee, IInd International Congress of Pesticide Chemistry, POB 16271, Tel Aviv, Israel)	Tel Aviv (Israel)
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March 1-3	Symposium on Antibiotics (Dr S. RAKHIT, Chairman of Organizing Committee, Symposium on Antibiotics, c/o Ayerst Research Laboratories, POB 6115, Montreal, Quebec, Canada)	St. Marguerite Quebec (Canada)
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June 14-17	International Symposium on Identification and Measurement of Environmental Pollutants (Dr I. HOFFMAN, Chairman, International Symposium on Identification and Measurement of Environmental Pollutants, c/o Analytical Chemistry Research Service, Central Experimental Farm, Canada Department of Agriculture, Ottawa, Ontario, Canada)	Ottawa (Canada)
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June 21-25	International Meeting on Boron Compounds (J. PLEŠEK, Institute of Inorganic Syntheses, Czechoslovak Academy of Sciences, Rež near Praha, Czechoslovakia)	Liblice (Czechoslovakia)
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July 5-9	IIIrd International Congress on Crystal Growth (Secretariat ICCG-3, Laboratoire des Mécanismes de la Croissance cristalline, Faculté des Sciences de Marseille, St-Jérôme, F-13 Marseille 13°, France)	Marseille (France)
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July 12-14	IIInd International Calorimetry Conference (Dr G. C. SINKE, Thermal Research Laboratory, Dow Chemical Co., Midland, Michigan 48640, USA)	Orono, Maine (USA)
July 12-16	IIIrd Society for Analytical Chemistry Conference (Mr C. A. JOHNSON, Secretary of Organizing Committee, IIIrd SAC Conference, Society for Analytical Chemistry, 9/10 Savile Row, London W1X 1AF, UK)	Durham (UK)
July 15-24	XXVIth International Conference of Pure and Applied Chemistry (Executive Secretary, IUPAC Secretariat, Bank Court Chambers, 2/3 Pound Way, Cowley Centre, Oxford OX4 3YF, UK)	Washington, DC (USA)
July 25-31	XXIIIrd International Congress of Pure and Applied Chemistry (Mr A. T. WINSTEAD, American Chemical Society, 1155 Sixteenth Street NW, Washington, DC 20036, USA)	Boston (USA)
August 16-21	Vth International Conference on Organometallic Chemistry (Organizing Committee, Vth International Conference on Organometallic Chemistry, Institute of Organo-Element Compounds, Academy of Sciences of USSR, Ul. Vavilova 28, Moscow B-312, USSR)	Moscow (USSR)
August 23-31	IVth International Symposium on Magnetic Resonance (Dr D. FIAT, Chairman of Organizing Committee, IVth International Symposium on Magnetic Resonance, c/o Weizmann Institute of Science, Rehovot, Israel)	Rehovot Jerusalem (Israel)
August 30- September 2	VIIIth Prague IUPAC Microsymposium on Macromolecules: Polymer Morphology (Microsymposium Secretariat, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Petřiny 1888, Praha 6, Czechoslovakia)	Prague (Czechoslovakia)
August 30- September 3	International Symposium on Chemical Education (Prof. E. GIESBRECHT, Instituto de Química, Universidade de São Paulo, Caixa Postal 8105, São Paulo, Brazil)	São Paulo (Brazil)
September 6-9	IXth Prague IUPAC Microsymposium on Macromolecules: Thermodynamics of Interactions in Polymer Solutions (Microsymposium Secretariat, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Petřiny 1888, Praha 6, Czechoslovakia)	Prague (Czechoslovakia)
September 6-10	Symposium on Advances in Microbial Engineering (Dr Z. ŠTĚRBÁČEK, Secretary of Organizing Committee, Symposium on Advances in Microbial Engineering, c/o Institute of Microbiology, Czechoslovak Academy of Sciences, Budějovická 270, Praha 4-Krč, Czechoslovakia)	Marienbad (Czechoslovakia)
1972		
April 3-7	International Congress on Analytical Chemistry (Prof. T. FUJINAGA, Faculty of Sciences, University of Kyoto, Kyoto, Japan)	Kyoto (Japan)
June 4-7	IIIrd International Symposium on Carotenoids other than Vitamin A (Prof. C. BODEA, Chairman of Organizing Committee, IIIrd International Symposium on Carotenoids, Ministerul Învăţămîntului, Institutul Agronomic «Dr Petru Groza», Strada Mănăştur 3, Cluj, Romania)	Cluj (Romania)
June 5-8	IUPAC-EUCEPA Symposium on Man-made Polymers in Papermaking (Mr L. NEIMO, Executive Secretary, IUPAC-EUCEPA Symposium on Man-made Polymers in Papermaking, c/o Finnish Pulp and Paper Research Institute, POB 10136, Helsinki, Finland)	Helsinki (Finland)
June 10-15	Microsymposium on Photochemical Processes in Polymer Chemistry (Prof. G. SMETS, Laboratoire de Chimie macromoléculaire, Université de Louvain, Celestijnenlaan 200 F, B-3030 Heverlee, Belgium)	Louvain (Belgium)
August	Vth International Congress on Catalysis (Dr. V. Haensel, Chairman of Organizing Committee, Vth International Congress on Catalysis, c/o Universal Oil Products Co., Algonquin Road, Des Plaines, Illinois, USA)	Miami Beach Florida (USA)

1973

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|---------------------------|--|----------------------|
| August 23–<br>September 2 | XXVIth International Conference on Pure and Applied Chemistry<br>(Executive Secretary, IUPAC Secretariat, 2/3 Pound Way, Cowley<br>Centre, Oxford OX4 3YF, UK)   | Hamburg<br>(Germany) |
| September<br>3–7          | XXIVth International Congress on Pure and Applied Chemistry<br>(Dr. W. FRITSCH, Gesellschaft Deutscher Chemiker, Carl-Bosch-<br>Haus, Varrentrappstrasse 40–42, Postfach 9075, D-6000 Frank-<br>furt/Main W 13, Germany) | Hamburg<br>(Germany) |

## NON-IUPAC MEETINGS

1971

- |                   |   |                 |
|-------------------|---|-----------------|
| May 31–<br>June 4 | Symposium on Biological Aspects of Electrochemistry (Prof.<br>G. MILAZZO, Istituto superiore di Sanità, Viale Regina Elena 299,<br>I-00161 Rome, Italy) | Rome<br>(Italy) |
|-------------------|---|-----------------|

*Recent and forthcoming Publications of IUPAC*  
*The Contents of these publications do not appear*  
*in Pure and Applied Chemistry*

## **THE NATURE OF METAL-AMMONIA SOLUTIONS**

Being the Proceedings of the Second International Colloque Weyl Symposium held at Cornell University in Ithaca, New York (USA) in June 1969 under the joint sponsorship of the International Union of Pure and Applied Chemistry, the Physical Chemistry Division of the American Chemical Society, and the Cornell Section of the American Chemical Society. Published as a Supplement to *Pure and Applied Chemistry*, xiii + 514 pages. Price: £11.

*Symposium Editors:* J. J. LAGOWSKI, University of Texas, Austin, Texas (USA) and M. J. SIENKO, Cornell University, Ithaca, New York (USA)

## **THE CHARACTERIZATION OF CHEMICAL PURITY. ORGANIC COMPOUNDS**

This is a monograph prepared under the sponsorship of the IUPAC Commission on Physicochemical Measurements and Standards and produced under the General Editorship of L. A. K. STAVELEY. *In press.*

*Contributors:* L. A. K. STAVELEY (UK), W. M. SMIT (Netherlands), E. F. G. HERINGTON (UK), T. PLEBANSKI (Poland), A. KREGLEWSKI (Poland and USA), C. P. SAYLOR (USA), D. AMBROSE (UK), L. B. WESTOVER and J. C. TOU (USA), W. J. POTTS and W. CRUMMETT (USA), J. P. HEESCHEN (USA), D. A. LONG (UK), and D. R. STULL (USA).

## **SURFACE AREA DETERMINATION**

Being the Proceedings of the International Symposium on Surface Area Determination held at the School of Chemistry, University of Bristol, Bristol (UK), during 16–18 July 1969 under the joint sponsorship of IUPAC and The Society of Chemical Industry. Published as a Supplement to *Pure and Applied Chemistry*, ix + 406 pages. Price: £10.

*Symposium Editors:* D. H. EVERETT and R. H. OTTEWILL, School of Chemistry, University of Bristol, Bristol (UK)

## **HIGH TEMPERATURE TECHNOLOGY**

Being the Proceedings of the Third International Symposium on High Temperature Technology held at Asilomar in Pacific Grove, California (USA), during 17–20 September 1967. Published as a Supplement to *Pure and Applied Chemistry*, xii + 752 pages. Price: £16.

**Published by BUTTERWORTHS, 88 Kingsway, London WC2**



## LIST OF ABBREVIATIONS

AOAC	Association of Official Agricultural Chemists
CBN	Commission on Biochemical Nomenclature
CEBJ	Commission of Editors of Biochemical Journals
CEE	Communauté Economique Européenne
CIG	Comité International de Géophysique
CIPM	Comité International de Poids et Mesures
CITCE	Comité International de Thermodynamique et Cinétique Electrochimique
CNRS	Centre national de la Recherche scientifique
COMECON	Council for Mutual Economic Assistance
COSPAR	Committee on Space Research
CSF	Compagnie Télégraphie Sans Fil
CSIRO	Commonwealth Scientific and Industrial Research Organization
DECHEMA	Deutsche Gesellschaft für chemisches Apparatewesen eV
EEC	European Economic Community
EMPA	Eidgenössische Materialprüfungs-Anstalt
EPPO	European and Mediterranean Plant Protection Organization
ETH	Eidgenössische Technische Hochschule (Zürich)
EUCEPA	European Committee on Cellulose and Paper
EUROTOX	Comité européen permanent pour la Protection des populations contre les risques de toxicité à long terme
FAGS	Federation of Astronomical and Geophysical Services
FAO	Food and Agriculture Organization
GEFAP	Groupeement européen des Associations nationales de Fabricants de Pesticides
IAEA	International Atomic Energy Agency
IAMS	International Association of Microbiological Societies
IAPT	International Association for Plant Taxonomy
IASH	International Association of Scientific Hydrology
IAU	International Astronomical Union
IBP	International Biological Programme
ICCA	International Commission for Cellulose Analysis
ICSU	International Council of Scientific Unions
ICUMSA	International Committee for the Unification of Methods of Sugar Analysis
IGU	International Geographical Union
IMU	International Mathematical Union
ISO	International Organization for Standardization
ITU	International Telecommunication Union
IUB	International Union of Biochemistry
IUBS	International Union of Biological Sciences
IUCr	International Union of Crystallography
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
IUNS	International Union of Nutritional Sciences
IUPAC	International Union of Pure and Applied Chemistry
IUPAP	International Union of Pure and Applied Physics

JCAM	Joint Commission on Atomic Masses
JCAR	Joint Commission on Applied Radioactivity
MIT	Massachusetts Institute of Technology
NAS	National Academy of Sciences
NATO	North Atlantic Treaty Organization
NBS	National Bureau of Standards
NRC	National Research Council
OECD	Organisation de Coopération et de Développement économiques
OEPP	Organisation européenne de Protection des Plantes
OMS	Organisation Mondiale de la Santé
SCAR	Scientific Committee on Antarctic Research
SCOR	Scientific Committee on Oceanic Research
UICC	Union internationale contre le Cancer
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHO	World Health Organization
WMO	World Meteorological Organization



## **IUPAC Rules of Nomenclature**

The following tentative rules of nomenclature have recently been issued by IUPAC:

- Nomenclature for Vitamins B<sub>6</sub> and Related Compounds
- Nomenclature of Carbohydrates-I
- Nomenclature of Boron Compounds

Gratis copies may be obtained by writing to: IUPAC Secretariat, Bank Court Chambers, 2-3 Pound Way, Cowley Centre, Oxford OX4 3YF (UK).

## **"PURE AND APPLIED CHEMISTRY"**

*The official journal of IUPAC*

The International Union of Pure and Applied Chemistry decided to publish the journal *Pure and Applied Chemistry* in conjunction with Butterworths so that chemists everywhere could benefit from the large amount of very important material handled each year by the Union. It was felt that matters of international importance had often not received a sufficiently wide circulation to make them easily available throughout the world. The journal has two objects: firstly to publish the main invited lectures of symposia sponsored by IUPAC, and secondly to publish the recommendations of the Union's Commissions on nomenclature, symbols and such matters as standard analytical procedure.

It is proposed to publish four volumes of *Pure and Applied Chemistry* in 1970, each volume containing approximately 600 pages. Should the Union consider additional material is of sufficient importance this will be issued as a bound volume supplementary to the journal.

Subscription: £12 (\$36.00) per volume. Reprints of individual symposia and reports may be obtained separately.

**Butterworths, 88 Kingsway, London WC2**

*A Monograph published under the Sponsorship of IUPAC*

## **EXPERIMENTAL THERMODYNAMICS, VOL. I**

Calorimetry of Non-reacting Systems

*Editors:* John P. McCULLOUGH and DONALD W. SCOTT

*Contributors:* D. C. GINNINGS (USA), H. F. STIMSON (USA), D. R. LOVEJOY (Canada), J. R. CLEMENT (USA), L. HARTSHORN (UK), A. G. McNISH (USA), E. D. WEST (USA), E. F. WESTRUM, Jr. (USA), G. T. FURUKAWA (USA), J. P. McCULLOUGH (USA), J. W. STOUT (USA), R. W. HILL (UK), D. L. MARTIN (Canada), D. W. OSBORNE (USA), T. B. DOUGLAS (USA), E. G. KING (USA), GUY WADDINGTON (USA), P. A. GRIGUÈRE (Canada), A. J. B. CRUICKSHANK (UK), TH. ACKERMANN (Germany), H. CHIHARA (Japan), J. A. MORRISON (Canada), C. W. BECKETT (USA), and A. CEZAIRLIYAN (USA).

14 chapters. 606 pages. Subject and Name Indexes Price £11 (postage extra).

**Published by BUTTERWORTHS, 88 Kingsway, London WC2**



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**INTERNATIONAL UNION OF PURE  
AND APPLIED CHEMISTRY**

**UNION INTERNATIONALE DE CHIMIE  
PURE ET APPLIQUÉE**

**INFORMATION BULLETIN  
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**FEBRUARY 1971**

**IUPAC SECRETARIAT**

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Cowley Centre, Oxford OX4 3YF, England  
Telephone—Oxford 70125, Telegrams—IUPAC OXFORD

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International Union of Pure and Applied Chemistry  
1971

## **IUPAC INFORMATION BULLETIN**

The Bulletin, issued three times per annum, provides a news medium for the various activities of IUPAC, especially of chemical topics which need regulation, standardization or codification. It includes details of forthcoming international symposia which are to be sponsored by IUPAC together with reports of such meetings which have recently taken place.

The Bulletin is available at an annual subscription of \$2.5 (£1) from the IUPAC Secretariat. Subscribers will also receive the two series of Appendices to the Bulletin: Tentative Nomenclature, Symbols, Units, and Standards; and Technical Reports.

### **Editor**

Dr. R. MORF  
Secretary General IUPAC  
POB 165, CH-8058 Zürich Airport  
Switzerland  
Telephone—(051) 839965  
Telegrams—IUPACAIRPORT ZURICH

# **XXVI IUPAC CONFERENCE**

## **WASHINGTON, DC, 15-24 JULY 1971**

The US National Committee for IUPAC has chosen Washington, DC, as the location for the XXVIth Conference.

### **Accommodation and Travel**

Full details of hotel accommodation and various travel schemes have already been distributed to National Adhering Organizations, to Associated Organizations, and to Titular and Associate Members and National Representatives of IUPAC bodies. Any queries should be addressed to the IUPAC Secretariat.

Travel and hotel arrangements are being handled through the IUPAC travel agency, Oxonian Travel Services Ltd., which is contacting participants on the basis of completed questionnaires returned to the IUPAC Secretariat. Coaches will be available to transport participants from Washington airport to the Mayflower Hotel. There will be an IUPAC information desk at the airport and a registration desk at the Hotel.

### **Visas**

The US State Department has been informed of the international nature of the Conference and applications for visas for entry into USA should be made by Conference participants as soon as possible to the US Embassy in their respective countries. An official letter supporting a visa application may be obtained from the IUPAC Secretariat.

### **Schedule of Meetings**

Subject to last minute changes, the Schedule of Meetings is as shown. Meetings will be held either in the Mayflower Hotel, Connecticut Avenue, or in the American Chemical Society Offices (5 minutes walk). Details of meeting rooms will be available on arrival at the Hotel.

### **Secretariat**

Throughout the Conference the IUPAC Secretariat will be located in the Pan-American and Cabinet Rooms of the Mayflower Hotel (far end of main lobby):

Telephone—202 DI 7-3000      Telegrams—Mayflower Washington

The Secretariat will be open daily from 0800 hours and provide typing, photocopying, and other services to assist Conference participants in their work. In addition, representatives of the IUPAC travel agency will be present to advise on travel and with suggestions for excursions.

### **Social Programme**

On 15th July the Conference will be opened with a buffet reception at US National Academy of Sciences. The main social function will be a banquet on 19th July in the Mayflower Hotel. A Ladies Programme is being planned.



### **Weather and Clothing**

Formal dress will not be essential for any of the social functions. The average summer temperature for Washington, DC, is 25°C, but it is likely to be higher during the month of July.

### **XXIII IUPAC Congress**

The Congress will take place at Boston, Massachusetts, from 25th to 30th July, *i.e.*, immediately after the Conference in Washington. Full details of the scientific programme were announced in *Information Bulletin* No. 38 (November 1970). Travel schemes combining the Conference and Congress are being operated by Oxonian Travel Services Ltd. on behalf of IUPAC.

# SCHEDULE OF MEETINGS FOR XXVIth IUPAC CONFERENCE

Meeting of	Thursday 15 July	Friday 16 July	Saturday 17 July	Sunday 18 July	Monday 19 July	Tuesday 20 July	Wednesday 21 July	Thursday 22 July	Friday 23 July	Saturday 24 July
Council							10-12 14-18		10-12 14-18	
Bureau						9-12 14-18				9-12 14-16
Executive Committee				9-12 14-18	9-12 14-18					16-18
Finance Committee								9-12 14-18		
Division Presidents										
Committee on Publications	9-12 14-18									
Inter-Divisional Committee on Machine Documentation		9-12				9-12 14-18				
Inter-Divisional Committee on Nomenclature and Symbols					9-12			16-19		
Coordinating Committee for Analytical Methods			19-21			19-21				
Committee on Congress Organization and Programmes			14-18			19-21 9-12 14-18				
Committee on Teaching of Chemistry					9-12 14-18					
<b>Clinical Chemistry Section</b>										
Section Committee					9-12 14-18					
Commission on Automation	9-12* 14-17	9-12 14-18	9-12* 14-18 14-18							
Commission on Teaching	9-12 14-17									
Commission on Quantities and Units				9-12 14-18		9-12 14-18				
Joint Meeting of V.3 and Commission on Automation of Clin. Chem. Section	9-12	9-12								

Meeting of	Thursday 15 July	Friday 16 July	Saturday 17 July	Sunday 18 July	Monday 19 July	Tuesday 20 July	Wednesday 21 July	Thursday 22 July	Friday 23 July	Saturday 24 July
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## Physical Chemistry Division

Division Committee	9-12				14-18 9-12	9-12 14-18				
Commission I.1: Physicochemical Symbols, Terminology and Units	9-12 13-17*	14-18*	9-12* 14-18	9-12* 14-18						
Commission I.2: Thermodynamics and Thermochemistry	13-17*	14-16 18-20*	9-12 14-18	9-12* 14-18						
Commission I.3: Electrochemistry	9-12 13-17*	14-18	9-12* 14-18	9-12* 14-18						
Commission I.4: Physicochemical Measure- ments and Standards	9-12 14-16	14-16	14-18	9-12*	9-12					
Commission I.5: Molecular Structure and Spectroscopy		14-18*	9-12 14-18	9-12 14-18						
Commission I.6: Colloid and Surface Chemistry	9-12 14-17	14-18	9-12 14-18	9-12*						
Joint Meeting of Com- missions I.2 and I.4 I.2 and I.2.1		18-20*		9-12						
Joint Meeting of Com- missions I.3 and V.5	13-17			9-12						
Joint Meeting of Com- missions I.1 and I.5		14-18		9-12						
Joint Meeting of Com- missions I.1 and I.2	13-17									
Joint Meeting of Com- missions I.1 and I.3			9-12							
Joint Meeting of Com- missions I.1 and I.6				9-12						

Meeting of	Thursday 15 July	Friday 16 July	Saturday 17 July	Sunday 18 July	Monday 19 July	Tuesday 20 July	Wednesday 21 July	Thursday 22 July	Friday 23 July	Saturday 24 July
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## Inorganic Chemistry Division

Division Committee		9-12			14-18					
Commission II.1.1: Atomic Weights		14-18	14-18	9-12 14-18						
Commission II.2: Nomenclature of Inorganic Chemistry	9-12 14-17	10-12 14-18	9-12 14-18	9-12 16-18		9-12				
Commission II.3: High Temperatures and Refractories	14-18	14-18	9-12 14-18							

## Organic Chemistry Division

Division Committee		9-12 14-18			14-18					
Commission III.1: Nomenclature of Organic Chemistry	9-12 14-17	9-12 14-18	9-12 14-18	9-12 14-18		9-12 14-18				
Commission III.2: Chemical Plant Taxonomy			9-12 14-18	9-12 14-18						
Section III.4: Medicinal Chemistry		14-18	9-12 14-18	9-12 14-18	14-18 9-12					
Open Meeting of Organic Chemistry Division										

## Macromolecular Division

Division Committee	9-12 14-17		9-12*							
Commission IV.1: Macromolecular Nomen- clature				9-12 14-18	14-18	9-12 14-18	14-18			
Joint Meeting of Division IV Committee, Section VI.6 and Section VI.7			9-12							



Meeting of	Thursday 15 July	Friday 16 July	Saturday 17 July	Sunday 18 July	Monday 19 July	Tuesday 20 July	Wednesday 21 July	Thursday 22 July	Friday 23 July	Saturday 24 July
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## Analytical Chemistry Division

Division Committee		9-12 14-18			14-17					
Commission V.1: Analytical Reactions and Reagents	9-12 13-17		9-12 14-18*	9-12 13-20*						
Commission V.2: Microchemical Techniques and Trace Substances			9-12 14-18	9-12 14-18						
Commission V.3: Analytical Nomenclature	9-12*	9-12 14-18	9-12* 14-18*	9-12 14-18						
Commission V.4: Spectrochemical and Other Optical Procedures for Analyses	9-12	14-17	9-12 14-18	9-12 14-18						
Commission V.5: Electroanalytical Chemistry	9-12	9-12 14-18	9-12 14-18	9-12* 14-18						
Commission V.6: Equilibrium Data	9-12 13-17		14-18*							
Commission V.7: Analytical Radiochemistry and Nuclear Materials		9-12	9-12	14-18	14-18					
Joint Meeting of Com- mission V.1 and Section VI.1			14-18	18-20						
Joint Meeting of Secretaries of Division V Commissions	13-17			9-12						
Joint Meeting of Com- mission I.3 and Commission V.5 (Chairman and Secs.)										
Joint Meeting of Com- mission V.3 and Commission on Automation of Clinical Chemistry Section	9-12		9-12							
Joint Meeting of Com- mission V.3 and Commission V.6			14-18							
Open Meeting of Analytical Chemistry Division					9-12					

Meeting of	Thursday 15 July	Friday 16 July	Saturday 17 July	Sunday 18 July	Monday 19 July	Tuesday 20 July	Wednesday 21 July	Thursday 22 July	Friday 23 July	Saturday 24 July
<b>Applied Chemistry Division</b>										
Division Committee	9-12				9-12					
Section VI.1:		10-11	10-12	14-16						
Food			14-18*	18-20*						
Sub-Commission VI.1.1.1:		11-12.30	9-10	9-12						
Mycotoxins		14-18								
Sub-Commission VI.1.1.2:		11-12.30	9-10	9-12						
Smoke Constituents		14-18								
Commission VI.1.2:	13-15*	11-12.30	9-10	9-12						
Food Additives and Con- taminants	15-17*	14-18								
Section VI.2:	13-15		9-12	9-12						
Fermentation Industries	15-17*		14-18	14-18						
Section VI.4:			9-12	9-12						
Toxicology and Industrial	13-17	14-18		17-20						
Hygiene										
Section VI.5:	13-15*	9-12				14-18				
Pesticides	15-17									
Commission VI.5.1:			9-12							
Terminal Pesticide Residues		13-17	13-17		9-12	9-12				
Commission VI.5.2:										
Pesticide Residue Analysis										
Section VI.6:		9-12	9-12*	9-12						
Organic Coatings	13-17	14-18	14-18	14-18*						
Section VI.7:		9-12	9-12*							
Pulp, Paper, and Board	13-17	14-18								
Section VI.8:		9-12	9-12	9-12						
Water, Sewage, and Industrial Wastes		14-18		14-18						
Open Meeting of Applied Chemistry Division					14-17					
Joint Meeting of Division IV Committee, Section VI.6 and Section VI.7			9-12							
Joint Meeting of Section VI.1 and Commission V.1			14-18		18-20					
Joint Meeting of Section VI.5 and Commission VI.1.2	13-15									
Joint Meeting of Section VI.2 and Commission VI.1.2	15-17									

\* Denotes Inter-Division/Inter-Section/Inter-Commission Joint Meeting

## REPORTS OF DIVISION PRESIDENTS AND CLINICAL CHEMISTRY SECTION

The following reports of activities since the XXVth IUPAC Conference (Cortina d'Ampezzo, 1969) were presented at the Bureau meeting in Vienna on 2-3rd October 1970.

### PHYSICAL CHEMISTRY DIVISION

This period has been characterized by an increasing amount of cooperation between Commissions, both within the Division and with other Divisions. Commission I.1 is collaborating actively with Commissions I.2, I.3, I.5, and I.6 on the special problems of symbols and nomenclature within these Commissions. A joint meeting of Commissions I.1, I.3, V.3, and V.5 was held at Oxford on 23-25th March 1970. The new series of Appendices to the *Information Bulletin* on Tentative Nomenclature, Symbols, Units, and Standards is proving to be an excellent and expeditious medium for obtaining reviews of tentative recommendations. Commissions I.3 and I.6 and the Division Committee are now represented on the CODATA Task Group on Data for Chemical Kinetics.

#### Commission I.1: Physicochemical Symbols, Terminology, and Units

The revised *Manual of Symbols and Terminology for Physicochemical Quantities and Units* benefited from unusually thorough worldwide review and comment. It has now been published in definitive form [*Pure and Applied Chemistry*, **21**(1), 1-44 (1970)]. A very high degree of conformity has been obtained with corresponding publications of IUPAP and ISO.

A program of producing appendices to the Manual on special topics is underway; this program includes separate appendices for thermodynamics and thermochemistry, electrochemistry, molecular structure and spectroscopy, and colloid and surface chemistry.

It is gratifying to note that the Chairman of Commission I.1 has been asked to serve as the official IUPAC representative on the Consultative Committee on Units of CIPM. The mole, long urged by Commission I.1 as a basic unit of the SI system, seems to be near adoption by CIPM.

#### Commission I.2: Thermodynamics and Thermochemistry

The Commission met in September 1969 in Warsaw during the *International Conference on Calorimetry and Thermodynamics* dedicated to the memory of W. SWIETOSŁOWSKI, who was a major contributor to the founding within IUPAC (*circa* 1920) of what are now Commissions I.2 and I.4. Arrangements have been made to hold a joint symposium with the US Calorimetry Conference in Maine (USA) on 12-14th July 1971 immediately prior to the XXVth IUPAC Conference in Washington, DC. This symposium will include the rapidly developing area of biochemical thermodynamics.

A report, initiated by the Commission, has been prepared by F. D. ROSSINI regarding the significance to physical chemists of the new 1968 *International Practical Temperature Scale*. It is scheduled for publication in *Pure and Applied Chemistry*, **22**(3-4), 555-570 (1970). *Journal of Chemical Thermodynamics* and *Bulletin of Thermodynamics and Thermochemistry*, both initiated by the Commission, are now viable self-supporting enterprises independent of IUPAC.

*Sub-Commission I.2.1: Plasma Chemistry.* This Sub-Commission, authorized by the Council at Cortina, is continuing to probe its area of interest and expects to hold a planning and exploratory session 12-14th July 1971 prior to the IUPAC Conference. Funds for this session are being requested.

A Working Group, chaired by J. D. COX, is studying standard substances for thermodynamics measurements and is working within the framework of the Commission I.4 Task Group on Standard Calibration Substances.

The Secretary, E. F. WESTRUM, Jr., is organizing the preparation of an updated *Resolution on the Publication of Calorimetric and Thermodynamic Data*. The target date for the document to be approved by the Commission is July 1971.

### **Commission I.3: Electrochemistry**

In the area of electrochemical thermodynamics an exhaustive compilation of electrode potentials and related  $\Delta G^\circ$  and  $\Delta H^\circ$  values is in preparation. A related compilation for electrochemical kinetics was completed some time ago but was not highly critical. It is relevant to note that Prof. V. N. KONDRATIEV has proposed that Commission I.3 considers a critical compilation in this area as part of the CODATA program on data for chemical kinetics. The Commission is currently studying *Guidelines for the Design of Mechanistically Significant Experiments in Electrode Kinetics*. An appendix to the *Manual of Symbols and Terminology* is being prepared in collaboration with Commission I.1. A symposium on *Non-Aqueous Electrochemistry* cosponsored by the Commission was held in Paris on 8-10th July 1970.

### **Commission I.4: Physicochemical Measurements and Standards**

A *Catalog of Physicochemical Standard Substances* has been distributed in the form of a Tentative Nomenclature Appendix to the *Information Bulletin*. The monograph on *Characterization of Chemical Purity. Organic Compounds* is in course of publication by Messrs. Butterworths. The first meeting of the Task Group on Standard Calibration Substances was held at Ludwigshafen on 18-19th July 1970. Guidelines for the work were formulated; the initial assignments of single properties were made to small groups which will carry out the work of screening and proposing materials. A report on the meeting is available from the Commission Chairman.

### **Commission I.5: Molecular Structure and Spectroscopy**

The Commission met in Sydney on 18-19th August 1969 in association with the XXII<sup>nd</sup> IUPAC Congress. A report on *Tentative Specifications for the Presentation of NMR Spectra for Publication in Chemical Journals* has been published as an Appendix to the *Information Bulletin*. It has been well received and requests for copies have much exceeded expectations.

At the Cortina Conference much of Section 2:8 of the *Manual of Symbols and Terminology* (section dealing with absorption spectrophotometry) had to be drastically revised and curtailed to achieve conformity with symbolism and terminology already approved by ISO on the recommendations of the International Electrotechnical Commission and the International Commission on Illumination. Some of the symbols and terminology in the definitive version of the Manual constitute a radical departure from current spectrophotometric practice. Commission I.5 is making a special effort to



acquaint spectroscopists with this section of the Manual. It will consult with Commissions I.1 and V.4 regarding the response obtained prior to or at the XXVIth IUPAC Conference in Washington.

Commission I.5 has initiated surveys of symbolism, nomenclature, and data presentation for photoelectron spectroscopy and Mössbauer spectroscopy. The Sub-Commission on Infrared and Raman Spectroscopy expects to complete a supplement extending the *Tables of Wavenumbers for the Calibration of Infrared Spectrometers* into the far-infrared region by July 1971. It will be submitted for publication in *Pure and Applied Chemistry*. This Sub-Commission, together with the Sub-Commission on Storage and Retrieval of Spectral Data, is preparing a tentative set of specifications for the documentation of Raman spectra. The Sub-Commission organized an informal meeting of Raman Spectroscopists (Chairman E. R. LIPPINCOTT) to discuss this at Ottawa in August 1969 in association with the *1st International Conference on Raman Spectroscopy*. A similar meeting is planned for the II<sup>nd</sup> Raman Conference at Oxford in September 1970. This is a matter of urgency because laser Raman spectra are accumulating rapidly.

### **Commission I.6: Colloid and Surface Chemistry**

*A Manual of Definitions, Terminology, and Symbols in Colloid and Surface Chemistry* has been published as an Appendix to the *Information Bulletin*. Comments received on this document will be reviewed at a special meeting to be held at Bristol on 24-25th September 1970. An additional document for the area of heterogeneous catalysis is in preparation.

As an aid to the teaching of colloid chemistry the Commission is now working on preparation of a resource book to contain interesting theoretical and experimental examples from the fields of colloid and surface chemistry.

Commission I.6 is also concerning itself with standard reference materials for the determination of surface areas.

One member of the Commission, expert in heterogeneous catalysis, is expected to become an IUPAC representative on the CODATA Task Group on Data for Chemical Kinetics.

G. WADDINGTON

## **INORGANIC CHEMISTRY DIVISION**

### **Meetings**

In Göttingen a meeting of Officers of the Division was held on 19th June 1970, attended by Prof. O. GLEMSE (President), Prof. V. GUTMANN (Vice-President), and Prof. R. COLLONGUES (Secretary). The minutes are available: they contain (1) Discussions about Names of New Elements, (2) IUPAC Unit on Coordination Chemistry, (3) Review of Work of the Commissions, (4) Preparation for the XXVIth Conference of IUPAC (1971, Washington, DC), (5) Any Other Business.

### **Commission II.1: Atomic Weights**

The main concern has been to publish and to disseminate widely information from the 1969 Commission Report containing the new Atomic Weights Table [*Pure and Applied Chemistry*, **21**(1), 91-108 (1970)], with important changes in the values for many elements based on critical evaluation of

published data and its significance. It is the intention of the Commission to continue the biennial evaluation of available literature and to recommend changes in the values for any elements when there is compelling evidence for the desirability for such changes. At this time the Commission intends in 1971 to reexamine especially the values for hydrogen and potassium.

Almost more important than the readjustment of values is the need to inculcate an awareness among chemists firstly of the less than satisfactory accuracy of the values for some of the elements (titanium, nickel, zinc, and germanium are examples) and of the inherent uncertainties arising from variabilities of isotopic composition.

The Commission intends to consider the replacement of Associate Members elevated to Titular Membership. Owing to the diversity of techniques and disciplines from which significant information on atomic weight values can now come, broad representation on the Commission is highly desirable.

### **Commission II.2: Nomenclature of Inorganic Chemistry**

At its meeting in Cortina d'Ampezzo (1969) the Commission dealt mainly with two items:

1. Revision of the 1957 Rules (*Red Book*).
2. Rules for organometallic compounds and organic compounds of boron, silicon, phosphorus, and arsenic. These rules are being prepared in collaboration with the Commission on Nomenclature of Organic Chemistry (III.1) and will eventually be published as Section D of *Nomenclature of Organic Chemistry (Blue Book)*.

In Cortina a Drafting Committee was appointed to finalize the manuscript for the new edition of the *Red Book*. This Committee completed its work at a meeting in Columbus, Ohio, at the end of January 1970 and the manuscript is now being prepared for press.

### **Commission II.3: High Temperatures and Refractories**

*Organization.* Since the meeting at Cortina, the Commission has been brought to a strength of six Titular Members, six Associate Members, and eight National Representatives.

*Meetings.* At Karlsruhe a meeting of the Commission was held on 24th April 1970, attended by eleven people: Prof. GLEMSER (President of the Division), five Titular Members, two Associate Members, and three National Representatives. Minutes are available.

*Technical Activities.* Vapour pressure work on gold has been completed and a standard material is available. A technical report has been issued as *NBS Special Publication* 260-19. The technical work for cadmium and silver has also been completed and the corresponding report 260-21 is currently undergoing editorial review. The melting point work on aluminium oxide has been reported in *Pure and Applied Chemistry*, **21**(1), 115-122 (1970). Dr. REES, in October 1969, transmitted the Commission's recommendation to the International Bureau of Weights and Measures, that the alumina point becomes a secondary reference point on the International Practical Temperature Scale. The *High Temperature Bibliography* has temporarily ceased publication because of the reassignment of duties of its editor Mr. J. J. DIAMOND of NBS. Dr. M. G. HOCKING of Imperial College (UK) has offered to act as editor and centre for distribution. Both he and the Commission Chairman are seeking sources of funds to cover printing and distribution costs. The Chairman is

attempting to persuade an eminently qualified scientist to write a definitive article on the current status of ionization cross sections. There is concern about the effect on the data being produced using mass spectrometry for high temperature chemical equilibria. Profs. ALCOCK and FITZER are involved in very preliminary thinking about conferences, respectively, on *High Temperature Techniques* and on *Hot Corrosion*. Approval to engage in these activities has been requested. Prof. FITZER is also considering the need for a definitive monograph on the varieties of carbon: the readership aimed at consists of those for whom carbon is not a speciality. Dr. CUBICCIOTTI is engaged in producing a Newsletter for high temperature chemists around the world. Through the inexperience of the Chairman to his Office and of Dr. CUBICCIOTTI to IUPAC some customs of the organization were overlooked. It is anticipated that this error can be easily overcome. The Newsletter is to serve as a means of communicating the activities of the Commission, hopefully, without controversy, probably twice yearly. By publicizing the activities it is anticipated that more specialized expert help can be obtained when needed.

O. GLEMSER

## ORGANIC CHEMISTRY DIVISION

The Organic Chemistry Division has maintained, with one exception, a vigorous programme of activity both in the organization of symposia and in the activity of its Commissions. The number of symposia with IUPAC sponsorship has greatly increased and a number of new biennial symposia are planned.

It had originally been intended that the Division Committee would meet in Munich in September 1970. However, since no major problems had arisen, and in an effort to save money, it was decided, after consultation with all Committee Members, not to hold this meeting.

It is appropriate in this introduction to make reference to the *VIIth International Symposium on the Chemistry of Natural Products* held recently in Riga. The exemplary success of the meeting was marred by the sudden and untimely death of the Honorary Chairman, Prof. M. M. SHEMAKIN, on the penultimate day. It is not necessary to make reference here to the great contributions that Prof. SHEMAKIN had made to organic chemistry, but it is desirable to state how hard he had worked to ensure that the VIIth Symposium was organized according to the ideals of IUPAC. Prof. SHEMAKIN intervened actively and successfully to ensure that all scientists who wished to attend the Riga meeting were able to obtain visas no matter what their country of origin. The Plenary Speakers at the VIIth Symposium have requested that the volume of Symposium lectures shall be dedicated to Prof. SHEMAKIN with an appropriate photograph and biographical memoir. The IUPAC publishing organization has kindly agreed to this request. It will constitute an appropriate memoir for a man of great distinction in all aspects of scientific activity.

## Nominations

The Division Committee has approved the following nominations since Cortina:

Commission III.2: Dr. S. NATORI (Japan)—Titular Member

Commission III.3: Prof. G. J. HOYTINK (UK)—Titular Member

Section III.4: Dr. A. I. RACHLIN (USA)—Titular Member [instead of  
Dr. L. STERNBACH (USA)]



Prof. J. A. GAUTIER (France)—Associate Member  
Dr. M. PROTIVA (Czechoslovakia)—Associate Member  
Dr. L. STERNBACH (USA)—Associate Member  
Prof. T. URBANSKI (Poland)—Associate Member

The untimely death of Prof. M. M. SHEMYAKIN (USSR) will create a vacancy for one Member in the Division Committee.

Dr. K. Takeda (Japan), nominated at Cortina as a Titular Member of Section III.4, declined the nomination due to ill health.

### Commissions

*III.1: Nomenclature of Organic Chemistry.* This important Commission has continued its work during the period 1969-1970. It will next meet near Arnhem, Netherlands, between 29th August and 5th September 1970. The tentative views of the Organic Chemistry Division as to the future composition of the Commission have been communicated to Prof. VERKADE, Chairman of the Commission, who will be retiring after the XXVIth IUPAC Conference in 1971. A reply will be awaited after the August meeting of the Commission. The most important single problem facing the Commission is the selection of a new Chairman. The Commission will meet again in Washington, DC, in 1971.

The combined edition of *Nomenclature of Organic Chemistry*, Sections A/B and C, approved at Cortina, is currently being prepared for press by Messrs. Butterworths. The tentative version of *Nomenclature of Carbohydrates* will shortly appear as an Appendix to the *Information Bulletin*; this version was also approved at Cortina.

Associated with Commission III.1 and with the Organic Chemistry and Macromolecular Divisions is the IUPAC-IUB Commission on Biochemical Nomenclature. This Commission, under the Chairmanship of Prof. O. HOFFMANN-OSTENHOFF, met in Helsinki on 1-4th July 1970. It faces important and difficult problems of nomenclature. The following sets of tentative rules were recently (1st April 1970) submitted to the Organic Chemistry Division:

- (i) Abbreviations and Symbols for Nucleic Acids, Polynucleotides and their Constituents
- (ii) Nomenclature for Vitamins B<sub>6</sub> and Related Compounds
- (iii) Abbreviations and Symbols for Description of the Conformation of Polypeptide Chains

Publication of these tentative rules has been approved by the Organic Chemistry and Macromolecular Divisions and will shortly take place as Appendices to the *Information Bulletin*.

The Organic Chemistry Division has requested the IUPAC-IUB Commission to produce an IUPAC definitive version of the following tentative rules of nomenclature (*Information Bulletin* No. 32, August 1968):

- (i) Nomenclature of Steroids
- (ii) Nomenclature of Cyclitols
- (iii) One-letter Notations for Amino-acid Sequences

*III.2: Chemical Plant Taxonomy.* This Commission met in Hornbaek, Denmark, on 11th and 12th June 1970. It is serving a widely felt need in the area between organic chemistry and biology and is maintaining close links with the appropriate biological organizations. A report from this meeting has been submitted to the Organic Chemistry Division. The Commission has plans to



organize a symposium under the title *Chemistry in Evolution and Systematics* in Strasbourg in the first half of 1972. The next meeting of the Commission will take place in Washington, DC, in 1971.

*III.3: Organic Photochemistry.* This Commission was established for good reasons at the meeting in Cortina in 1969. Unfortunately, the Chairman and Secretary have made only one appointment (Prof. G. J. HOYTINK) as Titular Member. At the *IIIrd IUPAC Symposium on Photochemistry*, held at St. Moritz, Switzerland, between 12th and 18th July 1970, the Chairman and Secretary met with Prof. HOYTINK to discuss the future composition and work programme of the Commission. It was proposed that the Commission should be changed into an interdisciplinary Section on *Electronically Excited States in Biology, Chemistry, and Physics*. The proposed members would not be organic chemists. Since this proposal, however worthy, does not serve the intention of the Organic Chemistry Division in sponsoring the Organic Photochemistry Commission, it is clear that extensive discussions will be necessary. It has been suggested that the Organic Photochemistry Commission should be reconstituted with a different Chairman and Secretary and that a document setting out the reasons for the new interdisciplinary Section should be prepared for discussion at the XXVIth IUPAC Conference.

*III.4: Medicinal Chemistry.* This new Section was initiated at the meeting in Cortina in 1969. It has proved to be an exemplary organization. The Chairman (Prof. CAMPAIGNE) and the Secretary (Dr. RACHLIN) have shown exceptional energy, initiative, and business efficiency in quickly setting up a Section which is already playing an important role in IUPAC. The Section held a first meeting (13-15th February 1970) in Zürich and has issued a concise report on its activities as well as a proposed 'constitution'. A standing Committee on Meetings has been organized under the Chairmanship of Dr. ARIENS. An *ad-hoc* Committee on Education in Medicinal Chemistry has been formed and a further small *ad-hoc* Committee has begun to look into *bad* patent practices. The Secretary is planning to issue a Section Newsletter. It is also intended to establish a system of *Correspondents* or *Representatives* who will exchange information of interest to medicinal chemists.

One of the problems that faces the Medicinal Chemistry Section is the existence of the so-called *International Society of Heterocyclic Chemistry* for which Prof. R. N. CASTLE of the University of New Mexico, Albuquerque, New Mexico (USA) has responsibility. This organization is seeking to perform a function, the regular organization of international meetings, that properly belongs to IUPAC. Correspondence between the Organic Chemistry Division and Prof. CASTLE has, unfortunately, not led to any improvement in the situation.

The next meeting of the Section of Medicinal Chemistry will take place in Washington, DC, in 1971.

### Sponsorship

Symposia already completed:

- (i) Conformational Analysis, Brussels, Belgium, 9-12th September 1969. A successful well-organised meeting.
- (ii) VIIth International Symposium on the Chemistry of Natural Products, Riga, USSR, 21-27th June 1970. This meeting was very efficiently organized and there was a large (1500) attendance.
- (iii) IIIrd International Symposium on Photochemistry, St. Moritz, Switzerland, 12-18th July 1970.

#### Forthcoming Symposia:

- (i) Vth International Symposium on Carbohydrate Chemistry, Paris, France, 17-22nd August 1970.
- (ii) International Symposium on Nonbenzenoid Aromatic Compounds, Sendai, Japan, 24-28th August 1970.
- (iii) Symposium on Cycloaddition Reactions, Munich, Germany, 7-10th September 1970.
- (iv) IInd International Symposium on Organic Solid-state Chemistry, Rehovot, Israel, 14-18th September 1970.
- (v) International Symposium on Antibiotics, St. Marguerite, Quebec, Canada, 1-3rd March 1971.
- (vi) International Meeting on Boron Compounds, Prague, Czechoslovakia, 21-25th June 1971.
- (vii) Vth International Conference on Organometallic Chemistry, Moscow, USSR, 16-22nd August 1971.
- (viii) IIIrd International Symposium on Carotenoids other than Vitamin A, Cluj, Romania, 4-7th June 1972.

#### Projected symposia:

- (i) VIIIth International Symposium on the Chemistry of Natural Products, Delhi, India, February 1972.
- (ii) Ist International Symposium on Physical-organic Chemistry, Switzerland, 1972—to be organized by Profs. E. HEILBRONNER and H. ZOLLINGER.
- (iii) Ist International Symposium on Organic Synthesis, Zürich, Switzerland, 1974—to be organized by Prof. C. H. Eugster.

#### Other Activities

As a result of the Division Committee Meeting in Cortina the Secretary of the Division has undertaken to consult with the Editors of the leading journals in the field of organic chemistry regarding their attitude towards problems of future publication practice. It is important to establish if in future all papers of adequate standard should continue to be published in full or if some abbreviated form of publication is acceptable with a deposition of the complete manuscript in central archives from whence a Xerox copy would be available at a small charge. The relationship between the publication of preliminary communications and the full publication of the experimental evidence also needs to be examined. At present there is a tendency to publish a preliminary communication and to forget the obligation thereby incurred to publish the full justification for the conclusions reached within a reasonable time.

The proposal has also been made that the Organic Chemistry Division should publish for general circulation a report on its scientific activities and objectives. The objective of this report would be to make the contributions of IUPAC to the present and future progress of organic chemistry more widely known.

### Budget (in US dollars)

1970

VIIth International Symposium on the Chemistry of Natural Products, Riga (June 1970)	4,000
Vth International Symposium on Carbohydrate Chemistry, Paris (August 1970)	1,000
Symposium on Cycloaddition Reactions, Munich (September, 1970)	4,000
IIInd International Symposium on Organic Solid-state Chemistry, Rehovot (September 1970)	1,000
Commission (III.1), Arnhem (August 1970)	3,103
Commission (III.2), Hornbaek (June 1970)	3,631
Commission (III.3), St. Moritz (July 1970)	1,000
Medicinal Chemistry Section (III.4), Zürich (February 1970)	3,408
Administrative Expenses	250
Division Programme and Contingency Fund	2,000
Total	23,392

1971

Division Committee, Washington (July 1971)	6,715
Commission (III.1), Washington (July 1971)	6,096
Commission (III.2), Washington (July 1971)	5,245
Commission (III.3), Washington (July 1971)	5,488
Medicinal Chemistry Section (III.4), Washington (July 1971)	6,841
Administrative Expenses	250
Division Programme and Contingency Fund	2,000
Total	32,635

1972

IIIrd International Symposium on Carotenoids other than Vitamin A, Cluj (June, 1972)	2,500
Symposium on Evolution and Systematics, Strasbourg	2,400

D. H. R. BARTON

### MACROMOLECULAR DIVISION

Since the 1969 IUPAC Conference in Cortina d'Ampezzo there has been only one formal meeting of the Division Committee which was held in Prague, 12-13th June 1970. The Minutes of that meeting give a detailed review of the Division's recent activities and preview for 1971 and beyond.

### Symposia

Regular *Symposia on Macromolecules* sponsored by IUPAC were organized in September 1969 in Budapest (over 1000 active participants) and in August 1970 in Leiden (over 700 active participants). In agreement with the general policy of the Division, the topics were restricted even in these general meetings: the Budapest Symposium was rather concentrated on chemistry and the



Leiden Symposium on physics. Besides these traditional scientific meetings stimulated and sponsored by IUPAC through the Division, there have been organized some smaller meetings strictly limited in their scope, the so-called *Microsymposia on Macromolecules* in Prague:

IVth Microsymposium: Rheology of Polymer Solids and Concentrated Solutions, 1-4th September 1969  
(162 active participants)

Vth Microsymposium: Cyclopolymers and Cyclopolymerization, 1-3rd September 1969  
(37 active participants)

VIth Microsymposium: Light Scattering in Polymer Science, 8-11th September 1969  
(98 active participants)

VIIth Microsymposium: Polyvinyl Chloride, Its Formation and Properties, 7-10th September 1970  
(230 active participants)

For a Gordon-type discussion meeting on *Models of Biopolymer Structure and Functions*, held in September 1970 in Marienbad, Joint Sponsorship was granted by IUPAC and IUPAB.

### **Future Meetings**

The Division Committee will recommend to the Bureau to grant sponsorship for the next general Symposium on Macromolecules in Helsinki in 1972.

For 1973 Dr. BARRETT has proposed to have a Symposium in UK. The opportunity of a joint British-Irish Symposium will be further discussed by British representatives with Prof. PEPPER.

Among smaller meetings (Microsymposia) the following announcements have been made:

Chemical Reactions in Polymers, Bratislava, June 1971

Polymer Morphology, Prague, August 1971

Thermodynamics of Interactions in Polymer Solutions, Prague, September 1971

Photochemical Processes in Polymer Chemistry, Louvain, June 1972

### **Working Party on Relationship of Performance Characteristics to Basic Parameters of Polymers**

A small Sub-Committee of this Working Party, headed by Dr. BARRETT, Dr. DE VRIES, and Dr. BENOIT, organized a working meeting on *Relaxation Phenomena and Mechanical Properties of PVC* in Strasbourg, 5-6th March 1970. There were about 50 participants. Two of the papers which were presented will be published in the near future. The great importance of such small meetings in which industrial and academic scientists can freely exchange their experimental findings was appreciated by all who attended.

The collaborative programme organized by this Working Party on Molecular Weight Determination and Properties of Polymer Samples has been summarized by Dr. BENOIT in a report containing results obtained from a great number of laboratories all over the world. He pointed out differences in the results for polystyrene while the data for PVC were much more homogeneous. It was concluded by the Division Committee that a full report with the exception of that part concerning polyvinyl acetate should be sent for



publication in *Pure and Applied Chemistry*. The same report would be sent in a more condensed form to as many polymer journals as possible. The public would be invited to submit their comments.

### **Nomenclature**

In its meeting at Ravello, 6-7th July 1970, the Nomenclature Commission continued discussions on stereochemical nomenclature of polymers and on nomenclature of linear polymers, and considered a number of recommendations on definitions, abbreviations, *etc.*, coming from ISO and from *Chemical Abstracts*. The revised version of *Basic Definitions of Terms Relating to Polymers* and of the list of *Abbreviations for Synthetic Polymers and Polymeric Materials* will be submitted for publication as Appendices to the *Information Bulletin* after a final set of comments by correspondence.

### **Teaching and Research in Macromolecular Chemistry**

A summary of the report, showing for different countries the percentage of polymer scientists with respect to the total number of physicists and chemists, has been distributed among the Members. The data refer to the last 3-7 years.

It was decided to question the Company Associates:

- (a) In which branch of science the needs are most urgent.
- (b) Their need for polymer scientists with respect to the total number of research workers at the company.
- (c) To give any proposal or suggestion in order to increase the number of polymer scientists at postgraduate level at different universities and scientific institutions.

### **Additional By-laws for Election of Division Members**

As procedure for the nomination of new Titular and Associate Members the following two By-laws were proposed:

'1. Not later than 12 months before the election date each Titular and Associate Member and National Representative of the Division may make not more than two nominations for new Titular Members and not more than two nominations for new Associate Members. Such nominations must be accompanied by relevant supporting biographical data and evidence of the nominee's willingness to serve if elected.

2. The Committee shall discuss the nominations received at a meeting prior to the meeting at which the elections are to take place. It has the right to make additional nominations and it shall make recommendations to the voting members of the Committee for filling the vacancies.'

In view of the elections which will take place in Washington, DC, in July 1971, a list of candidates for Titular and Associate Membership has been set up. It was strongly felt that the propositions which had so far been received by the President were not representative enough of the different disciplines and did not take into account sufficiently the relative importance of industry and academic people as well as their geographical distribution.

### **Relations with Division of Applied Chemistry**

Following the recommendation of Dr. CAIRNS, it was decided to keep contacts especially with the Sections on Organic Coatings (VI.6) and on Pulp, Paper, and Board (VI.7) whose domains are directly connected with macromolecular science.

O. WICHTERLE

## ANALYTICAL CHEMISTRY DIVISION

Since the XXVth Conference of IUPAC, held in Cortina d'Ampezzo in 1969, ten reports have been published in *Pure and Applied Chemistry* and four more have been approved by the Division Committee for publication. Two tentative nomenclature reports have been published in Appendices to the *Information Bulletin*. Three further reports are being considered by the Division Committee.

The Division provides seven members of a Working Group set up by the Bureau to examine the possibilities of establishing an International Centre for Analytical Chemistry. The Working Group is scheduled to meet in September 1970 to finalize its report to the Bureau in October 1970.

### Commission V.1: Analytical Reactions and Reagents

This Commission has continued to work on methods of analysis for control of the purity of food additives. More work has been done on methods not approved at Cortina and comments have been collected on the methods selected for the 1970 contract with CEE. Liaison with Section VI.1 on this project has been strengthened. It is proposed in 1971 to review all the methods considered to date to help CEE in finalizing for publication all of the IUPAC recommended procedures. It is hoped that some more fundamental work, having a bearing on the CEE contract project, may be started in the near future.

### Commission V.2: Microchemical Techniques and Trace Analysis

Collaborative work is being conducted on four items of interest to organic microanalysts—the determination of fluorine, nitrogen, carbon and hydrogen, and of metals; a report on the purification of reagents used in microanalysis and trace analysis is expected soon. A questionnaire has been distributed on the problem of the determination of trace impurities in high-grade chemicals and a study of the detection and determination of trace impurities in oxygen and helium is under way. The Commission is scheduled to meet in September 1970.

### Commission V.3: Analytical Nomenclature

This Commission is making considerable progress on its reports on recommended nomenclature for ion exchange, chromatography, scales of working, mass spectrometry, and usage of the terms normality, molarity, and formality in analytical chemistry, for all of which finalized reports are expected within two years. Five other projects on nomenclature are under active consideration, including the possible IUPAC approval of nomenclature for thermal analysis proposed by the International Confederation on Thermal Analysis. A report on trivial names of analytical reagents, requested by the Inter-Divisional Committee on Nomenclature and Symbols, has been circulated for comments; the need for specifications for standard substances continues to be studied and there will shortly be official representation with the ISO group also studying this problem. Progress on several items has been markedly speeded up by meetings made possible by use of the Division Contingency Fund. The Commission is scheduled to meet in November 1970.



#### **Commission V.4: Spectrochemical and Other Optical Procedures for Analyses**

This Commission is studying the comments received following the publication of its tentative report on the nomenclature of atomic emission spectroscopy. A second tentative report on the nomenclature of flame atomic absorption, emission, and fluorescence is approaching finalization and good progress is being made on the nomenclature of X-ray fluorescence spectroscopy and electron microprobe analysis. Reports on the classification of light sources and the concepts required for determination of detection limits are expected shortly. A meeting of the Commission is scheduled for August 1970.

#### **Commission V.5: Electroanalytical Chemistry**

This Commission has previously issued reports on the purification of solvents used in electroanalytical chemistry and more are being finalized as are two reports on electrochemical data in non-aqueous solvents. Considerable progress has been made on a report on nomenclature of electroanalytical methods, materially assisted by a meeting made possible by use of the Division Contingency Fund. Close liaison with Commission I.3 is being maintained to prevent any clash between the recommendations of the two groups. Work is progressing on a compilation of polarographic data and on reports on the pretreatment of solid electrodes and purity of reagents. In view of the advances in theory and instrumentation of coulometric analysis, a draft of a report recommending the adoption of the Faraday constant as an electrochemical standard has been made. Progress is being made on the compilation of pK values of organic bases.

#### **Commission V.6: Equilibrium Data**

The continuing programme of this Commission on tables of stability constants has suffered a setback owing to the illness of one of the principal workers on the project but progress is still being made. Good progress has been made on tables of distribution equilibrium data for organophosphorus and other chelating extractants. The possibility of developing a system of coding abstracts to indicate the presence of numerical data in original papers is under active consideration. A meeting of members of the Commission is scheduled for September 1970.

#### **Commission V.7: Analytical Radiochemistry and Nuclear Materials**

This Commission has completed its first article publicizing radioactive methods in analytical chemistry. Two further articles, on light element analysis and high-energy photon activation, are being prepared. A report on intercomparison of analytical methods has been completed and future trace characterization exchanges may be proposed after the experience gained by Commission Members partaking in a current OECD exchange. This experience and the Commission's examination of reference materials for activation analysis has emphasized the great need for standard reference materials not only for activation analysis but for all types of trace analytical procedure. Significant results have already been obtained on potential standard materials for trace analysis and a summary of recommended values should be available for publication in 1971. First reports on the analysis of uranium oxides and of graphite and on the compilation of references in radiochemistry are also

expected in 1971. The first part of the Commission's report on nomenclature and symbols in radiochemistry is expected shortly and work is proceeding on Part II. Drafts of proposed conventions for flux monitoring are being prepared for discussion at the IUPAC Conference in 1971.

W. KEMULA

## APPLIED CHEMISTRY DIVISION

This report summarizes briefly the activities of the Division since the XXVth IUPAC Conference at Cortina d'Ampezzo in 1969.

There has been no meeting of the Division Committee as such during this period. The Executive Committee appointed an *ad-hoc Committee* to consider how the structure and working of IUPAC might be modified to cater for the needs of applied chemistry. This Committee met in Frankfurt in June 1970 under the Chairmanship of Dr. R. W. CAIRNS, Vice-Chairman of the Division. Minutes of the meeting have been issued for discussion at the forthcoming Division Presidents and Bureau meetings in Vienna, and need not be discussed further in this report. The Frankfurt meeting examined the functions and activities of the Division in the broadest terms, in relation to modern needs, and in relation to activities of other Divisions of IUPAC and other international bodies.

### Section VI.1: Food

This Section operates under two Commissions, dealt with separately below.

Commission VI.1.1 (Trace Substances) is divided into Sub-Commission VI.1.1.1 (Mycotoxins) and Sub-Commission VI.1.1.2 (Smoke Constituents). In the field of Mycotoxins, the principal activity has been the completion and evaluation of the collaborative study on aflatoxin standards. The complete study has been prepared in manuscript form and distributed for consideration and decision at the meeting of the Commission in Netherlands in September. A rapid aflatoxin method developed by a producer has been collaboratively studied and will be considered for adoption as an IUPAC method.

In the field of Smoke Constituents, a discussion is being planned on the nitrosamines at the September meeting in Netherlands. There is a sharply increased interest in these and related compounds as carcinogens and toxicants. A collaborative study of a multi-component method for polycyclic aromatic carcinogens has been delayed but will go forward.

Commission VI.1.2 (Food Additives and Contaminants) has prepared an interim report on its work on solvents used in the food industry. This includes all of the seven solvents used extensively in this industry and the work was carried out at the suggestion of FAO. The report includes both methods of analysis and unified minimum specifications. The toxicological acceptability of these specifications, in particular for total and polycyclic aromatic hydrocarbons, will be considered by FAO/WHO.

### Section VI.2: Fermentation Industries

The Section has met during the week of 23rd August in Mexico City but the minutes of that meeting were not available at the time of compiling this report.

In 1969 the Section published *A Standardization of Methods for the Determination of the Alcohol Content of Beverages and Distilled Potable Spirits*



[*Pure and Applied Chemistry*, 17(2), 273-312 (1968)] which is being generally adopted worldwide as a basis of international collaboration and agreement in trade. A Working Group of the Section has continued the study of the standardization of the characteristics of SCP (Single Cell Protein), a very important basis for acceptance of the safety of such products in animal feeds and eventually in human foods. Cooperation is maintained on this topic with FAO/WHO/UNICEF. Plans are well advanced for the *IVth International Fermentation Symposium* to be held in Japan in 1972. The progress report issued on *Evaluation of Active Dry Baker's Yeast* (*Information Bulletin* No. 37, April 1970) has been widely distributed and should form a good basis for further advances in this field.

### **Section VI.3: Oils and Fats**

This Section is meeting in Stockholm on 3rd and 4th September 1970.

It has continued to make progress on various analytical methods, including those for elaidic acid, for chlorinated pesticides in edible oils and fats, and for trans fatty acids by infrared spectrophotometry. Various reports are being prepared on these topics.

### **Section VI.4: Toxicology and Industrial Hygiene**

This Section has continued its programme with exchange of results among its Members by correspondence. It is expected that decisions will be reached at the 1971 Conference in Washington, DC, on a number of methods under investigation.

A large number of individual compounds are included in these studies. They include toxic compounds in industrial and occupational areas, and in ambient air of communities. Methods for the determination of various elements and compounds in biological fluids (blood, urine, expired air) are under study. In addition, analytical methods for a number of carcinogenic compounds in the environment are under study. The latter is being carried out in cooperation with the International Agency for Research on Cancer.

### **Section VI.5: Pesticides**

This Section operates under two Commissions, and the work of each is dealt with separately below.

Commission VI.5.1 (Terminal Pesticide Residues) has examined several problems and reviewed their status. One deals with the concept of *half-life* to denote the rate of disappearance of a pesticide under specified conditions. Current information is being collated on the terminal residues on a wide variety of pesticides, including many new ones. The first edition of a Newsletter on various topics previously considered by the Commission has been circulated to the Members.

Commission VI.5.2 (Pesticide Residue Analysis) has worked largely on problems assigned by FAO/WHO for use by their Codex Alimentarius Commission. The methods for multiresidue analysis of organochlorine compounds have been endorsed by FAO/WHO. Methods for residues of organophosphorus pesticides, fumigants, and organomercurials are under consideration by FAO/WHO. Further work on the residues of a wide variety of other compounds will be formally requested by FAO/WHO. Attention is being given to a format for describing analytical methods and their applicability.

The two Commissions are meeting in Erbach-Rheingau during the period 14-18th September 1970.

### **Section VI.6: Organic Coatings**

This Section will be meeting in Copenhagen on 10th and 11th September. The work on analytical methods for alkyd resins is nearly complete and an extensive programme on the analysis of acrylic resins is well under way. The report *Assessment of Application Properties of Brushing Paints* has been issued and is being cleared for publication in specialized journals.

There has been considerable negotiation on a proposal for a series of monographs on *Progress in Surface Coatings*, but no agreement has been reached as yet in view of a conflict with established IUPAC publication procedures.

### **Section VI.7: Pulp, Paper, and Board**

This Section did not meet at the Cortina Conference. Since that time it has been active through correspondence, and through an informal meeting in conjunction with an international pulp and paper conference. The Section will meet in Stockholm early in November 1970, in conjunction with the *International Congress on Industrial Waste Water*, when a programme will be put together for approval by the Division Committee.

### **Section VI.8: Water, Sewage, and Industrial Wastes**

This Section met in London on 5th February 1970. Preparations for the major *International Congress on Industrial Waste Water* to be held in Stockholm, 2-6th November 1970, are approaching completion. This Congress is attracting world-wide interest and an outstanding programme has been prepared.

Cooperation has been initiated with COWAR (Committee on Water Research of ICSU), particularly in a project entitled *Long-term Trends in Water Quality of Rivers and Lakes of the World*. The Secretary of the Section attended a COWAR meeting in Geneva in April 1970. At the request of the International Association on Water Pollution Research (IAWPR), the latter has been requested to nominate an Associate Member of the Section, and collaboration with this organization is being established.

W. GALLAY

## **CLINICAL CHEMISTRY SECTION**

The Clinical Chemistry Section and its three Commissions did not meet during the XXVth IUPAC Conference at Cortina d'Ampezzo. Instead, meetings were held in Geneva at the time of the *VIIIth International Congress of Clinical Chemistry* (September 1969). Accounts of these meetings were included in *Comptes Rendus XXV Conference*.

In 1970 the Officers of the Section and its Commissions have met on the occasion of the *Italian Congress of Clinical Chemistry* (Stresa, April). Concern was expressed at the lack of detail in the IUPAC Statutes and By-laws with regard to functioning of Sections. The Section had nominated Dr. R. DYBKAER as its representative on the IUPAC Inter-Divisional Committee on Nomenclature and Symbols. Dr. DYBKAER had also participated, on behalf of the Section, in a meeting of the IUPAC-IUB Commission on Biochemical Nomenclature at Helsinki in July. The Section had been approached by IAEA about an

international analytical quality control service, and it awaited with interest the deliberations of the IUPAC *ad-hoc* Working Group studying the possible establishment of an International Centre for Analytical Chemistry.

### **Commission on Automation**

The controversy with the Commission on Analytical Nomenclature over *Recommended Nomenclature for Automatic Analysis* had been resolved and the report had gone forward for publication. Meanwhile, the Commission had commenced work on a revision of its own proposals which would be considered in a revised nomenclature recommendation from IUPAC. These proposals would also form part of a wider report on automated analysis being prepared by the Commission.

### **Commission on Quantities and Units**

There had been extensive correspondence with Commission I.1 to ensure conformity of the shortened version of IUPAC-IFCC Recommendation 1966 *Quantities and Units in Clinical Chemistry* with the new IUPAC *Manual of Symbols and Terminology for Physicochemical Quantities and Units*. It was hoped to publish the shortened version in the near future as an Appendix to the *Information Bulletin*. Work was continuing on new proposals for quantity descriptions relevant to clinical chemistry. The Section on Toxicology and Industrial Hygiene was participating in some work of the Commission.

### **Commission on Teaching**

Drafts of the first four chapters of a monograph dealing with the status of clinical chemistry throughout the world, were being evaluated by the Commission. The material to be used in preparing a fifth chapter was expected to be available shortly. A scheme had been approved for revising the various National Reports by the end of 1970.

M. C. SANZ



## REPORTS OF IUPAC BODIES

### INTER-DIVISIONAL COMMITTEE ON MACHINE DOCUMENTATION IN THE CHEMICAL FIELD

Frankfurt/Main, 27-28 April 1970

*Present:* Prof. J. E. DUBOIS (in the chair), Dr. J. W. BARRETT, Dr. J. B. VAN EYK VON VOORTHUYSEN, Dr. H. SCHENK, Dr. C. SUHR, Dr. F. A. TATE.

*Apologies for non-attendance:* Dr. R. N. JONES, Dr. G. B. BOKII.

#### Introduction

Dr. TATE, who had accepted to act as Convenor for the inaugural meeting of the Committee and who had prepared the items on the agenda for discussion, thanked all Members present for their participation and expressed his personal appreciation as well as that of the Committee to the German representatives who made possible this inaugural meeting in the congenial atmosphere of the Carl Bosch Haus.

#### The Committee's Mission

Dr. MORF (Secretary General of IUPAC) had sent the Members a copy of Dr. BYRON RIEGEL's report to the IUPAC Bureau in July 1969, containing recommendations for constituting a Committee (*Information Bulletin* No. 36, pp. 27-30). Part IV of this report (Recommendations) gives in two paragraphs the nature (A) and the possible tasks (B) of the Committee:

A—IUPAC appoints a Commission to work for the standardization and codification in the machine handling of chemical information. It should be a Joint Commission of all the Divisions of IUPAC and have responsible representatives who are directly involved in editorial programs, especially primary and secondary publications.

B—The first task of the Commission should be directed towards the machine handling of chemical structures and the computer generation of nomenclature.

There is a real need for a unique definition of chemical structure which is understandable on the printed page and yet logical, unambiguous to a computer program. Different structures must have a unique positioning in a formal list, universally applicable and can be readily understood by the processors and users. The original system must be well designed so that it will not be necessary to change continuously and improve.

The above basic principles would require the following for the fulfilment of the objectives:

- (1) Consistency in full range of names
- (2) Greatly reduced numbers of rules and elimination of so many exceptions
- (3) Simplified, consistent numbering of cyclic nuclei
- (4) Computer-checkable intra-name consistency
- (5) Efficient cross checks between names and structural diagrams
- (6) Widely accepted rules for expressing names in reduced character sets
- (7) Standard and universally accepted practices for the selection of index compounds.



Bearing this in mind, Dr. TATE had asked the Members of the Committee to present suggestions or work documents for the organization of the first meeting. The Members thus had at their disposal:

- i—several documents presented by Dr. TATE, pertaining to nomenclature problems,
- ii—a letter from T. A. MELROSE (Shell Technical Information Division, UK) about *Chemical structure line notations*, referring to certain modifications of IUPAC notation.
- iii—a document of suggestions presented by Prof. DUBOIS, which, in addition to the different papers on nomenclature, mentions problems linked to input and output and inter-system convertibility.

Various exchanges of opinion led the Committee to analyse the report of Dr. RIEGEL's group. In general, the viewpoints expressed (I, II, III) were judged excellent. However, as regards the recommendations (IV) leading to the creation of the Committee, paragraph B was found somewhat restrictive considering the previous context.

A general discussion then took place on the Committee's potential goals, resulting in three types of proposal:

- 1—A definition of the Committee's goals expressed within extended *terms of reference*.
- 2—The need for a model or general diagram able to render an account of the complexity of automatic or non-automatic information systems both existing or to be developed.
- 3—Situating the Committee's action with regard to and in awareness of the activities of other organisms concerned with the functioning and development of international networks.

These three points formed the subject of further analysis.

### Goals and Terms of Reference

The two following paragraphs were adopted and are to be completed by B of the recommendations (IV), starting with 'Initially, the task of the Commission should . . .' (see p. 2):

'The purpose of the Committee will be

to work on standardization and codification in the machine handling of chemical information within the total process of storage and retrieval for transferring original information through primary publications to the final user.

The initial task of the Committee will be directed towards establishing minimal standards for compatibility of the machine handling of representations of chemical structures to permit the development of an effective international chemical information network. Hopefully this will lead to interlinkage with other scientific technical information handling systems.'

## Model of Diagram: Documentation or Information Flow Sheet

In order to facilitate its future work, the Committee believed it was possible to define a type of characteristic model of information systems by analyzing, as in chemical engineering, in the form of *a process flow sheet, the passage of information from the primary literature to the users, defining transfer levels and documentary process functions.*

A model should help the Committee more easily to define and agree on definitions and terminology which naturally were the source of the usual difficulties of a first meeting on such a complex subject.

The process flow sheet for a field of documentation, to which the Committee devoted a good part of its work by way of exploration, was based on several general ideas:

i—*Three levels.* The processing of primary information; more specialized processing (primary and secondary information); and finally, dissemination to individual customers or to customer centres (where firms are concerned).

Although it was premature at this point to limit ourselves to strict definitions, we can state that roughly speaking the first and second levels correspond to *processing actions*. Even if there is a certain amount of reprocessing on the third level, the major activity there is the dissemination of *incoming processed information*.

ii—*Process functions.* Three basic functions are noted:

- (1) Acquisition
- (2) Indexation
- (3) Dissemination

During the meeting, in order to determine the main features of the model, the Committee used various graphic representations which are not found in this report. Prof. DUBOIS would send the Committee Members a diagram to serve as a work tool or as a point of departure. Some of the ideas proposed on this subject are summarized as follows.

*Model information flow sheet and documentation centres.* Such a model does not imply any *a priori* notion of the organization of information centres whose activities may bear on different levels and may comport some, if not all, of the process functions (see Dr. RIEGEL's report, p. 28, paragraph E: General Factors—'different kinds and levels of information processed').

The Committee briefly discussed the situation of certain existing Centres. It seemed possible to summarize, albeit succinctly, this first exchange of views as follows:

(a) Those Centres which process either primary or primary and secondary information, thereby turning it into processed information, may be placed either on the first level (*e.g.*, chemistry) or on the second (particularly, specialized centres—shipbuilding, textile, *etc.*, as well as data banks).

(b) Certain Centres distribute or disseminate processed information and are clearly situated on the third level. (These dissemination centres either open outwards towards the public or are private industrial centres which open inwards for the use of their own firms.)

(c) The three process functions (ii) lead to consecutive stages which are at times all integrated in a single centre (CAS), while at other times they have led to centres whose activities are more specialized but who work in series (CID+IDC).

*Model information flow sheet and intersectorial network.* The model defined for a scientific discipline (e.g., chemistry), or for a sectorial activity (textile, shipbuilding, etc. . . .) can provide a basis for the conception of an intersectorial network. The question of interfaces or bridges between different sectors should be a subject of study for the Committee.

### **Activities of the Committee and Outside Activities**

The Committee discussed paragraph II of the 1969 report *Survey of the different approaches already in hand throughout the world* which concludes that there are many internationally sponsored activities which we should not duplicate.

The members are interested in an identification of bodies already involved in the field (national and international).

An effort will be made to obtain a reasonable amount of information concerning this rapidly evolving field.

The Committee believes that, given the international position of IUPAC, its activity can hasten the setting up of an international network. All the Members will assemble as much information as possible on the mission and activities of other institutions or organizations (UNISIST, ICSU, OECD, FID).

### **Conclusion**

During the discussions, various viewpoints were exposed or debated, but it was deemed preferable to postpone them to a subsequent meeting, the inaugural session having primarily served to determine the essential goals and working methods of the Committee.

In particular, the Committee felt the need to define, for its own use, the notions of primary and secondary publications, to proceed as soon as possible to a thorough study of the minimal requirements for the first level (input and output) and finally, to specify the users' needs (final output).

The Committee hoped to hold two meetings per annum with an established agenda for each and, if possible, on the basis of reports prepared between meetings. The next meeting was suggested for either the end of 1970 or the start of 1971. Paris was proposed.

J. E. DUBOIS

## **IUPAC-IUB COMMISSION ON BIOCHEMICAL NOMENCLATURE**

**Helsinki, 4-6 June 1970**

All ten members [A. E. BRAUNSTEIN, W. E. COHN (Secretary), O. HOFFMANN-OSTENHOF (Chairman), P. KARLSON, B. KEIL, W. KLYNE, C. LIÉBECQ, E. C. SLATER, E. C. WEBB, W. J. WHELAN], three Representatives from IUPAC Nomenclature Commissions (S. VEIBEL, CNOC; K. L. LOENING, CMN; R. DYBKAER, CQUCC) and the Treasurer of IUB, Prof. F. G. YOUNG, were present and considered the following items.

### **I. Revision of Enzyme Nomenclature (1964)**

The Sub-Committee preparing this revision had met the previous day and now discussed with CBN the many facets of its work, which included: (a)



circulation of a list of the large number of new entries arising since 1964; (b) revision of mode of entry, favoring accepted trivial names over systematic names although the latter will be retained; (c) formation of Sub-Sub-Committees to perfect the several classes of new entry and to integrate with the older ones (and revise the latter); (d) revision of introductory chapters; (e) introduction of SI system. It was estimated that the Report would be finished late in 1971.

## **2. Isoenzymes, Definition, and Classification**

A Sub-Committee's report was discussed and the work was to continue within more narrowly defined concepts.

## **3. Organic Phosphorus Nomenclature**

A report would be prepared linking common trivial names to the systematic names evolved by CNOC. A Sub-Committee was to be appointed.

## **4. Carbohydrate Nomenclature (joint with CNOC)**

The newest version was approved in principle and would be circulated, for formal changes only, to CEBJ. Parts 2 and 3 (Symbols and Trivial Names, and Polysaccharides) would be undertaken in similar fashion by a joint CNOC-CBN Sub-Committee. Part 4 (other areas) were presently under consideration by others, but CNOC-CBN participation was anticipated.

## **5. Carotenoids**

A joint CNOC-CBN document was approved in principle and was to be circulated to CEBJ (as with Carbohydrates, 4 above).

## **6. Nonheme Iron Proteins**

A draft document was in circulation in the Sub-Committee. It was described and discussed.

## **7. Tetrapyrroles (joint with CNOC)**

A preliminary proposal was in the hands of CNOC.

## **8. Mucopolysaccharides**

The Sub-Committee expected to report later in 1970.

## **9. Conformations of Polysaccharides and Polynucleotides**

Sub-Committees had been appointed, both convened by KENDREW, who convened the Sub-Committees on Polypeptide Conformations (now finished and in press).

## **10. Peptide Hormones**

A Sub-Commission had been appointed.

## **11. Tocopherols**

A solution to the problem of naming various isomers was approved and would be published.



## **12. Amino Acid Nomenclature**

A draft document was in preparation. A list of trivial and systematic names would be included.

## **13. Fibrin-Fibrinogen Nomenclature**

The Sub-Commission that was asked to review this outside document reported; the report was approved and would be forwarded.

## **14. Immunoglobulin Nomenclature**

A request for review from 'outside (WHO) was referred to a Sub-Committee.

## **15. Other Nomenclatural Matters**

Alkaloids and diterpenes were under consideration by CNOC and CBN. A report from outside on steroid glycosides was tabled for the moment. Prochirality and chirality were under consideration by an independent group with close contact with CBN.

## **16. Reports**

LOENING, Chairman of CMN, described its activities.

## **17. Documents Published or in Press 1970**

Nomenclature of Vitamins B<sub>6</sub>; Abbreviations and Symbols for Nucleic Acids, Polynucleotides and Their Constituents; Description of Conformation of Polypeptide Chains; Revisions of Proposal for Nomenclature of Lipids.

## **18. Revisions of Older Documents Contemplated**

At the suggestion of CMN and the American Chemical Society Commission on Polymer Nomenclature, CBN contemplated and approved a revision of its documents in this area to avoid making *poly* a separate term.

## **19. Publication of CBN Documents**

Various aspects of CBN's multi-faceted publication scheme were reviewed.

W. E. COHN

# **COMMITTEE ON PUBLICATIONS**

**London, 30 June 1970**

*Present:* Sir HAROLD THOMPSON (Chairman), Dr. L. C. CROSS, Dr. H. GRÜNEWALD, Dr. R. L. KENYON, Prof. B. C. L. WEEDON (Scientific Editor), Dr. R. MORE, Dr. M. WILLIAMS.

## **Revised Version of 'IUPAC—What it is—What it does— How it works—How it is financed'**

The success of a recent article by Prof. W. KLEMM on the work of IUPAC was noted and the possibility was discussed of preparing a revised version of that written some years ago by Prof. W. A. NOYES, Jr. It would be desirable in this

revision to emphasize the value of IUPAC in the applied fields. In view of the discussion now taking place about a possible reorganization of the Applied Chemistry Division, the matter was temporarily deferred, so that any alteration of structure could be taken into account.

### **Publications Arising from XXIII IUPAC Congress**

At present 184 main lectures were scheduled for 32 symposia (organic, macromolecular, various joint) at the Congress. The lectures promised to be of a particularly high standard and it was agreed IUPAC should attempt their publication in a set of supplements to *Pure and Applied Chemistry*.

### **Future Content and Use of Information Bulletin**

At the XXVth Council Meeting (Cortina d'Ampezzo, 1969) it was resolved to publish future tentative nomenclature rules as Appendices to the *IUPAC Information Bulletin*. Sir HAROLD THOMPSON had drawn attention to the consequent need for devoting thought to the future content and use of the Bulletin.

A memorandum from Dr. WILLIAMS, dealing with the contents, production, and distribution of the Bulletin, was considered. It was agreed that:

- (i) The Secretariat should obtain estimates for printing the Bulletin in UK in 1971, for consideration at the XXVIth Bureau Meeting (Vienna, 2-3rd October 1970).
- (ii) The Bulletin should be mailed free to editors of appropriate national chemical journals, with permission for them to reproduce such material as they wished, preferably in the form of a regular news feature on IUPAC.
- (iii) A more definite publication schedule was necessary in future.
- (iv) Technical reports, e.g. Evaluation of Active Dry Baker's Yeast: A Progress Report 1965-1968 (*Information Bulletin* No. 37), should be issued as Appendices to the Bulletin in the same way as tentative nomenclature rules.
- (v) The principle of restricting distribution of gratis copies should be reviewed when the number of paid-subscribers was known more accurately.

### **Sponsorship by IUPAC of Symposia**

(i) *Jointly with Other Organizations.* The *ad-hoc* Committee on Interdisciplinary Matters had suggested that one of the best ways of promoting interdisciplinary cooperation was to encourage scientific meetings cosponsored with other Scientific Unions. To facilitate the organization of such meetings, it had recommended that the policy for publication by IUPAC should be more flexible.

IUPAC reserves the right to publish in *Pure and Applied Chemistry* the whole or part of the proceedings of any symposium which it sponsored or it initiated and cosponsored. This aspect of the publishing contract between IUPAC and Messrs. Butterworths must be respected. However, the past record shows that IUPAC has been flexible in waiving this right for several symposia to which sponsorship was granted. It was decided that a phrase

along the lines 'The publication of proceedings of a symposium cosponsored with another Union shall be the subject of special arrangements' should be added to the Advance Information Questionnaire.

(ii) *Selectivity*. There was an increasing demand for sponsorship of symposia by IUPAC, on which decisions were taken by the Bureau (Executive Committee) following the advice of appropriate Division Presidents, Chairman of Editorial Board and Scientific Editor. The Division Presidents at the XXVIth Bureau meeting should be alerted to the need for greater selectivity in granting sponsorship, irrespective of publication aspects of the matter.

### **Future Size of IUPAC Publications**

A letter was considered from Messrs. Butterworths, dealing with possible changes in size of *Pure and Applied Chemistry*: ISO sizes were well suited to journals but not to books. Dr. CROSS pointed out that our present dilemma arose from the policy of reprinting IUPAC journal material in bookform. It was agreed to devote a whole future meeting to discussion of basic IUPAC publication policy. Meanwhile, the size of publications should remain Royal Octavo.

### **Price and Frequency of Pure and Applied Chemistry in 1971**

The latest IUPAC Publications Status Report showed sufficient material now being processed by Butterworths to fill the 4 volumes of the journal in 1970; sufficient material had already been accepted from 1970 symposia to fill 4 volumes in 1971. It was decided to publish 4 volumes in 1971 but to defer consideration of a price rise until 1972.

### **Writing up the First 50 Years of IUPAC History**

Dr. REES had requested that consideration be given to the question of writing up the first 50 years of IUPAC history. It was recommended that:

- (i) The collection of IUPAC archives at the Secretariat in Oxford, initiated by transfer of documentation from Maison de la Chimie in Paris, be completed by addition of material now in the hands of Dr. MORF and others. The availability of these archives for consultation be announced.
- (ii) Until IUPAC funds permitted the payment of a suitable person to write up the history, the matter be deferred.

### **Specific Matters**

(i) *Selected Constants. Oxidation-Reduction Potentials of Inorganic Substances in Aqueous Solution* (Commission V.5). This report constituted a revised version of Vol. 8 (1958) of *Tables of Constants and Numerical Data*, which could be considered the logical successor to the standard reference work in the field: W. M. LATIMER's *Oxidation Potentials*. It was agreed that it be published as a supplement to *Pure and Applied Chemistry*.

(ii) *Erreurs en Microanalyse Organique Elementaire* (Commission V.2). This report was too long to be included in *Pure and Applied Chemistry* and rather specialist in its appeal. The Committee decided to ask Butterworths to consider it as a supplement to the journal.



(iii) *Monographs on Surface Coatings*. This project had originated outside IUPAC but now had the support of Section VI.6. The IUPAC publishing policy of non-payment of fees was reaffirmed by the Committee on Publications. Section VI.6 should not devote any of its working time to the project unless this requirement could be observed.

(iv) *Addresses Reprint from Comptes Rendus XXV Conference*. The Secretariat was instructed to proceed with production of a corrections-additions addendum to Section B of *Comptes Rendus XXV Conference*.

### **Report from Assistant Secretary re. Audiotape for Symposia**

This report had been referred by the Bureau for consideration by the Committee on Publications. Consideration was deferred to the meeting on discussion of basic IUPAC publishing policy.

H. W. THOMPSON

## **COMMISSION ON ELECTROCHEMISTRY (I.3)**

**Paris, 6-7 July 1970**

*Present*: BRUSSET, EPELBOIN, HAASE, JORDAN (Chairman), KORYTA (Secretary), LEVART, MILAZZO, MINC, PARSONS, SANFELD, TAMAMUSHI. Apologies for absence were received from GERISCHER and TANNENBERGER.

### **1. Minutes of Meeting in Cortina d'Ampezzo, July 1969**

The minutes were ratified, as they appeared in print in *Comptes Rendus XXV Conference*.

### **2. Questionnaire on Electrochemical Kinetic Data**

It was resolved that Dr. TAMAMUSHI should proceed with collecting data, based on a questionnaire distributed in advance of the meeting. Copies of this document were available by writing to the IUPAC Secretariat. It was understood that Dr. TAMAMUSHI did not propose to collate *at this time* information on complex electrocatalytic processes, such as the cathodic hydrogen evolution reaction.

### **3. Guidelines for the Design of Mechanistically Significant Experiments on Electrode Kinetics**

There were no objections to the finalized version submitted by Prof. JORDAN, which represented a consolidation of previous drafts emanating from JORDAN and TAMAMUSHI. It was decided that Prof. JORDAN should forward the *Guidelines* to the IUPAC Secretariat for publication in the *IUPAC Information Bulletin* (see p. 63, this issue) and appropriate journals. These should include the periodicals selected at an earlier date for publication of the program of Commission I.3. It was resolved that the following journals should be added to that list: *Berichte der Bunsengesellschaft*, *Gazetta Chimica Italiana* and *Roczniki Chemii*.



#### **4. Plans for Drafting an Authoritative Document on Methods of Electrode Kinetics**

It was suggested that Commission I.3 should undertake the preparation of a critical outline of experimental methodologies recommended for the elucidation of electrochemical kinetics. The consensus was that such a *methods manual* might evolve from experience gained in the collation of rate data in accordance with item 2 (above).

#### **5. Nomenclature and Symbols**

To serve as the basis of an *Electrochemical Appendix* to the *IUPAC Manual of Symbols and Terminology for Physicochemical Quantities and Units*, Prof. KORYTA and Dr. PARSONS were requested to draft recommendations encompassing definitions and symbols for the following concepts: Faraday constant; charge numbers of ions and of cell reactions; electromotive force; electrode potentials including standard and conditional (formal) potentials; electrochemical-, chemical-, real-, outer-, inner-, surface-, Galvani-, and Volta-potentials; point of zero charge; electric mobility; electrolytic, molar and equivalent conductivities; cell constant of a conductometric cell; transport number; current and mean current; overpotential; electrode reaction rate constants; standard electrode reaction rate constant and electrochemical (or charge) transfer coefficient; exchange current density; limiting current density; limiting diffusion current density; diffusion layer thickness; mixed potential.

#### **6. Tabulation of Electrochemical Thermodynamic Data**

A progress report on this continuing project was presented by Prof. MILAZZO and duly noted by Commission I.3.

#### **7. Next Meeting**

A three-day program of meetings of Commission I.3 was scheduled within the framework of the XXVIth IUPAC Conference in Washington, DC, July 1971. Provision would also be made for joint meetings with Commissions I.1 and V.5.

J. JORDAN

#### **Joint Meetings of Commission on Electrochemistry (I.3) and Commission on Electroanalytical Chemistry (V.5)**

##### **Paris, 9 and 11 July 1970**

*Present:* (Paris, 9 July 1970)—Prof. I. M. KOLTHOFF, Prof. J. JORDAN, Dr. R. PARSONS, Prof. B. TRÉMILLON, Prof. L. MEITES, Prof. P. ZUMAN; (11 July 1970)—Prof. I. M. KOLTHOFF, Prof. J. JORDAN, Dr. E. LEVART, Prof. L. MEITES, Prof. P. ZUMAN.

It had been suggested to circulate the list of symbols prepared by Commission I.3 to Members of Commission V.5 with request for comments. Prof. KOLTHOFF proposed that in order to expedite publication of symbols used in electrochemistry for which Commission I.3 is primarily responsible and in electroanalytical techniques which are the responsibility of Commission V.5, Prof. MEITES, who is Chairman of the V.5 Sub-Committee on Classification of Electroanalytical Methods should prepare a tentative list of symbols most commonly used in electroanalytical methods, which would be submitted for

comments to Members of Commissions I.3 and V.5. Prof. JORDAN and Dr. PARSONS welcomed this proposal. In the opinion of Prof. ZUMAN, Commission V.5 should first prepare the classification and definitions of electroanalytical techniques as approved in Cortina d'Ampezzo and deal with symbols in a systematic way after the above task was finished. Comments received so far by Prof. MEITES indicated that the use of symbols would be much more controversial than the classification and definitions. The problems involving symbols used in electroanalytical techniques should be thus first discussed at the Commission V.5 meeting in Washington, DC (July 1971) before a list was sent for approval of Commission I.3. In further discussion Prof. KOLTHOFF suggested that the symbols used in the following techniques should be included in the table prepared by Commission I.3: chronopotentiometry, chronoamperometry, and polarography.

It was suggested that any reports emanating from the activities of Commissions I.3 and V.5 concerning nomenclature and symbols should be published not only in the *IUPAC Information Bulletin*, but also in journals widely circulated among electrochemists and electroanalytical chemists for comments to be received before finalization. The Division Committees were requested to consider and act on these proposals.

The preliminary form of the report on *Classification and Nomenclature of Electroanalytical Methods* was presented and those present were informed that the Table on Small Amplitude Techniques was being typed by Dr. H. W. NURENBERG and that Prof. ZUMAN had prepared the list of definitions. The limitations and presentation of the Report were discussed. Terminology synonymous to proposed terminology should be included in Tables and submitted for comments. No strong feelings were expressed about the inclusion of less important methods into the Classification. The terminology and importance of *mixed potentials* were discussed.

Terminology of indicator, reference, auxiliary, working and counter electrode were discussed. The terms *indicator (test)* and reference electrodes were agreed upon; however, it was proposed that *auxiliary* should be adopted as a synonym for *counter* electrode and that the term *working electrode* should be added.

Commission V.5 asked whether there were strong feelings about the symbol for *applied voltage*. Since no opinion of Commission I.3 was known, it was decided to deal with the matter in the future.

Whenever a symbol had been used internationally for a long time (e.g.,  $i$  for current as  $I$  is used for the so-called diffusion current constant  $I = i/k \text{ cm}^{2/3} \text{ t}^{1/6}$ ) such symbols should be retained. Adopting the recommendations by the physicists (symbol  $I$  for current) would cause great confusion to and resistance by electroanalytical chemists.

The decision on inclusion of graphs and on presentation of Tables was left with Prof. MEITES.

The following general recommendation was formulated: Any proposal originating from Commissions I.3 and V.5 should be submitted for comment to as many electrochemists and electroanalytical chemists as feasible.

Commissions I.3 and V.5 would keep in touch by post and their Chairmen and Secretaries would meet in Washington, DC, during the XXVIth IUPAC Conference.

P. ZUMAN

# COMMISSION ON MACROMOLECULAR NOMENCLATURE (IV.1)

Ravello, 6-9 July 1970

*Present:* K. L. LOENING (Chairman), P. CORRADINI, R. B. FOX, G. J. SMETS, C. SUHR, T. TSURUTA, L. C. CROSS (Secretary). A telegram was received from Prof. O. WICHTERLE (President of the Division) expressing his regrets at inability to attend.

## 1. Minutes of Previous Meeting

These were taken as read; individual items were dealt with as they arose during the present meeting.

## 2. List of Abbreviations for Synthetic Polymers and Polymer Materials

The list drafted at the previous meeting was refined. Among the documents considered during this revision was ISO R 1043. Members were to send comments or corrections to the Secretary within 30 days. Thereafter the document would be sent to the IUPAC Secretariat for publication. The President of the Division would be invited to obtain the Division's approval and to recommend publication to the IUPAC Bureau.

## 3. Basic Definitions of Terms Relating to Polymers

The list drafted at the previous meeting was refined, and the revised version was intended to be a fully *coherent* set of definitions. Members were to send comments or corrections to the Secretary within 30 days. The document would then be sent to the IUPAC Secretariat for publication. The President of the Division would be invited to obtain the Division's approval and to recommend publication to the IUPAC Bureau.

CORRADINI, SMETS, and TSURUTA were to constitute a Correspondence Group for further work and refinement of these and future definitions.

## 4. Stereochemical Nomenclature of Polymers

A preliminary study was made of CORRADINI's document, particularly as part of the development of the list of basic definitions (see item 3 above). It was agreed that Members would study the concepts and usages of CORRADINI's proposals, obtain advice from local experts, and feed suggestions back to CORRADINI. He would produce a revised version for consideration at the 1971 meeting.

It was noted that use was made in CORRADINI's document of the terms *skew* and *gauche*. These are not used in *IUPAC Tentative Rules for Nomenclature of Organic Chemistry, Section E: Fundamental Stereochemistry* (IUPAC Information Bulletin No. 35, pp. 36-80). The Secretary was instructed to ask the Organic Nomenclature Commission for its views on the use of these terms, particularly in polymer nomenclature.

## 5. Nomenclature of Polymers

Study was begun of some proposals for the general nomenclature of linear organic polymers, embodied in a document due to Fox. This document was, in turn, a development of some tentative nomenclature proposed by a



Committee of the ACS Division of Polymer Chemistry [*Macromolecules*, **1**, 193-198 (1968)]. Following general discussion Fox agreed to redraft the document for the 1971 meeting. Members were to send comments and suggestions to him by 1 November 1970, and to deal specifically with the following points:

- I. How should the document be organized—
  - (a) Segregation of extended examples and discussion to the end (as in Fox's present document).
  - (b) All extended examples and discussion pertaining to a particular point to be incorporated in the Rule dealing with that point (a more usual IUPAC nomenclature system).Consensus at the meeting was in favour of the second system, with greater breakdown of the rules, so that each Sub-Rule dealt with one point only, and with provision of a table of contents and adequate indexes.
- II. Whether or not the basis of the nomenclature for single-strand polymers should be units limited by free-valencies. There was preference for this system at the meeting.
- III. It was agreed that the sequence of citation of sub-units must be strictly directional, *i.e.*, from one end of the constitutional base unit to the other. It remained, however, to confirm whether the selection of the sub-units to be cited should be based on a strict scientific priority of structure types or whether regard should be paid to convenience of naming as recognized organic groups. There was preference for the former at the meeting.
- IV. In the redraft full attention should be paid to the use of the agreed terms, *e.g.*, *constitutional base unit* instead of *repeating unit*.

## 6. ISO Recommendations R 472: Definition of Terms

It was not possible to consider this adequately during the Commission's own set of basic definitions. The Chairman was therefore requested to report to Dr. KLINE that the Commission had not time to define a collective reaction, being concerned in the first instance in developing a fully coherent set of definitions from first principles, but would hope that ISO would take the Commission's lists (items 1 and 2) into account in its further deliberations. Comments provided to LOENING by 15 September 1970 would be passed to KLINE.

## 7. Membership of Commission

SUHR had indicated a wish to resign. Having been appointed to the IUPAC Inter-Divisional Committee on Machine Documentation he no longer felt able to devote adequate effort to the problems of this Commission. He wished, however, to be kept informed of the Commission's work and to comment where he could. His resignation as a Titular Member was received with regret. Efforts by the Chairman to replace SUHR by another German Titular Member were approved.

The continued lack of reaction by or communication from Prof. KORSHAK was noted and the Commission asked its Chairman to draw the Division's attention to the need for all Titular Members of the Commission to be active in its deliberations. A replacement should be sought.



CORRADINI agreed to become a corresponding member of two Sub-Committees of the IUPAC-IUB Commission on Biochemical Nomenclature—one on conformations of peptide chains, the other on conformations of polysaccharides.

L. C. CROSS

## SECTION ON FERMENTATION INDUSTRIES

Mexico City, 17-18 August 1970

*Present:*—Titular Members Dr. A. F. LANGLYKKE (Chairman), Dr. F. PARISI (Vice-Chairman), Dr. J. C. HOGERHEIDE (Secretary), Dr. R. J. ERTOLA (Argentina), Prof. A. FIECHTER (Switzerland), Dr. S. KINOSHITA (Japan) and Acad. I. MÁLEK (Czechoslovakia); Associate Member Prof. G. TERUI (Japan). Apologies for absence were received from: Titular Member Prof. S. J. PIRT (UK) and from Associate Members Mr. W. K. BRONN (Germany), Dr. H. J. BUNKER (UK), Mr. R. F. LIGHT (USA), Dr. H. J. PEPLER (USA), Prof. R. DJURTOFT (Denmark) and Prof. H. SUOMALAINEN (Finland). Eng. WÜTZEL of the International Association for Cereal Chemistry was invited to attend part of the meeting devoted to discussion of the project *Standards for Active Dry Yeast*.

### IV International Fermentation Symposium (Kyoto, 19-25 March 1972)

Prof. TERUI informed the meeting that an *Advance Information Questionnaire* requesting IUPAC sponsorship had been sent to the IUPAC Secretariat for proper action. A draft of a First Circular, soliciting papers and inviting attendance at the Symposium, was submitted for discussion.

The scientific program would include: focal topic sessions (16 topics, related to industrial fermentation, to be discussed in approx. 30 papers by invited speakers); and scientific tours to universities and industrial plants. The First Circular was approved at the meeting and would be ready for distribution within a few weeks.

Prof. TERUI also supplied a draft budget based on a target attendance of 1100 full members and 150 associate members. A registration fee of \$50 for full members and of \$25 for associate members would be charged. An expected contribution of \$27,800 from the Japanese Government and of \$68,400 from Japanese industry might have to be supplemented by a subvention of \$10,000 from the sponsor (IUPAC) in order to balance the budget. Dr. LANGLYKKE mentioned that his request for such a subvention had not been acted upon as yet and that he again would bring this matter up for consideration by the proper IUPAC authorities. It was stressed that IUPAC subvention would be used for scientific purposes only and not for entertainment. Prof. TERUI gave an assurance that entertainment and banquet fees would be paid in part by the participants and in part from industrial contributions.

Concerning the publication of lectures and papers to be given at the Symposium it was unanimously agreed that the content of lectures and papers with a microbiological background was not suitable for *Pure and Applied Chemistry*. Dr. LANGLYKKE would seek release of publication rights via Dr. GALLAY and the IUPAC Secretariat. An enquiry by Prof. T. WIKEN (Delft) whether it might be desirable and possible to hold the *International Yeast Symposium*, to be sponsored by the Yeast Council and also planned for

1972, in conjunction with the *International Fermentation Symposium* at Kyoto, was discussed at great length. Since insufficient information was available on the program of the Yeast Symposium it was decided that Dr. HOOGHEIDE would discuss this matter with Prof. WIKEN in order to determine whether there was sufficient common base for incorporating certain topics in a common session or whether it would be preferable to hold the Yeast Symposium fully independently before or after the Fermentation Symposium. Prof. TERUI doubted the desirability of two organizations contacting the same industries for contributions destined for symposia to be held at the same place and at practically the same time.

### **International Symposium on Microbial Engineering (Marienbad, 6-10 September 1971)**

Acad. MÁLEK informed the meeting that the preliminary program of this Symposium would consist of two panel discussions on:

*Quo vadis* Biochemical Engineering  
Education in Biochemical Engineering

The major topics of the papers to be presented would be:

Growth Kinetics  
Production Kinetics  
Fundamentals of Fermentor Design  
Fermentation Equipment Design and Control  
Other Operations in Microbial Engineering

There would be 13 invited speakers on the main topics. Within a few weeks the First Circular should be distributed. Attendance of approx. 150 scientists was expected. A draft budget would be forthcoming.

A letter from the IUPAC Secretary General informing Acad. MÁLEK of IUPAC acceptance of sponsorship, provided that the 13 specially invited lectures would be published in *Pure and Applied Chemistry*, was discussed. For the same reason as mentioned above it was considered advisable to seek release of this requirement.

### **V International Fermentation Symposium (proposed for Berlin, under auspices of Institut für Garungsgewerbe, 1976)**

It was considered highly desirable to continue the sponsorship of this series of Symposia. However, it was deemed not necessary yet to take action.

### **Symposium on Chemistry of Antibiotics (planned by IUPAC Section on Medicinal Chemistry)**

It was agreed that cosponsorship of such a Symposium was well within the scope of activities of Section VI.2 and earned its full support. However, the initiative for organizing such a Symposium should come from the Section on Medicinal Chemistry.

### **Rules for IUPAC Sponsorship of Symposia**

Dr. HOOGHEIDE gave a survey of the recently published rules for IUPAC sponsorship of symposia and congresses and of the subvention for such sponsorship. A lively discussion was held on this matter. There was general

agreement that these rules were incomplete and open for varying interpretation. It was felt that an appropriate IUPAC Division or Section should not only be asked for an opinion as to the desirability of sponsorship, but should be charged with the responsibility of requiring that the Organizers of a Symposium adhered strictly to the high standards, essential for obtaining IUPAC sponsorship. It was also mentioned that, due to broadening of the applied interests of IUPAC, Divisions and Sections had been created covering fields ill-suited for publication in *Pure and Applied Chemistry*. If it was the purpose of IUPAC to bring these results to the attention of all scientists interested and active in these particular fields, publication should be in journals which were normally read by these scientists. It was decided that via the proper channels attempts should be made to bring this matter to the attention of the Bureau and Executive Committee for possible correction.

### **Standard Methods for Measuring Alcohol Content**

Extensive worldwide distribution of the alcohol tables, issued by Section VI.2, carried out by the Research Laboratories of the Finnish Alcohol Monopoly under the direction of Prof. SUOMALAINEN and published in *Pure and Applied Chemistry*, took place during the past year. Acceptance by most organizations dealing with alcohol determination in fermented liquids was excellent and it appeared that these tables fulfilled an international need.

OIML on the other hand would have preferred tables based on the (small) revisions of the basic Osborne values as worked out by Kawakaki instead of using the original Osborne values, which formed the basis for the IUPAC tables. The new OIML tables were expected to be issued in 1972; the differences between OIML and IUPAC tables would be so small as to be insignificant for practical purposes.

### **Methods for Evaluation of Active Dry Baker's Yeast**

Dr. PARISI's progress report on this subject had been published in *IUPAC Information Bulletin* No. 37 (April 1970). It was concluded that the variations with the SJA method obtained in different laboratories using the same yeast and the same flour might be attributable to slight variations in the technique used by the different laboratories and that the details of the technique should be further studied, standardized, and specified.

Eng. WÜTZEL of the International Association for Cereal Chemistry, who attended part of the meeting as a guest, proposed that a small group of ICC, namely Ir. GREUN of Royal Netherlands Fermentation Industries, Dr. GRYLIS of Distillers, Eng. WÜTZEL of Vogelbusch and possibly Dr. SCHULZ of Bundesforschungsinstitut für Getreide should investigate these discrepancies and try to design a refined technique which would give reproducible results in different laboratories. This proposal was accepted and it was decided that Dr. PARISI would act as coordinator of the group. Upon completion of this study another largescale cooperative test could be organized, ultimately culminating in an internationally acceptable method for evaluating the quality of active dry yeast.

### **Worldwide Survey of Fermentation Industry for 1967**

Dr. LANGLYKKE submitted a report on this project, but explained that due to a very poor response in answering the questionnaire his data were incomplete



while for many countries no data or only inaccurate data could be obtained. In spite of this it was decided that the material collected was interesting and valuable enough for publication. Drs. HOOGERHEIDE and PARISI would study the report and may recommend certain changes before it was presented for publication.

### **Standards for Protein of Microbial Origin derived from Hydrocarbons**

Dr. HOOGERHEIDE and Acad. MÁLEK outlined the action the Committee on this project was going to take in the near future. The Committee was of the opinion:

- (1) that for the time being the use of protein of microbial origin should be restricted to *animal feed adjunct*.
- (2) that each microbial organism used or proposed for the production of animal feed adjunct should be thoroughly tested for the absence of toxic effects as well as for an acceptable digestibility. Standard tests will have to be designed.
- (3) that changes in the technique of production, such as use of other strains of the same species, other or modified substrates, changes in the isolation and/or purification procedure, present potential danger points and thus require additional safety tests in order to prove absence of toxic effects and of acceptable digestibility.
- (4) that once a manufacturer used a standardized process for producing a certain quality of microbial protein this product should be subjected to the following tests:—

Determination of

- (a) true protein content (not 6.25 times N)
  - (b) nucleic acid content
  - (c) digestibility of the protein fraction
  - (d) amino acid composition of the protein
  - (e) lipid content
  - (f) hydrocarbon content
- (5) that, from time to time, comparative tests must be made with a standard product of the same source, which had previously been used for extensive safety testing.

The Committee intended to design suitable test methods for these criteria during the next year after consulting several experts on food technology and analytical chemistry of food products, possibly in cooperation with the IUPAC Food Section (VI.1).

### **Food produced by Fermentation**

It was decided to abandon this project. Dr. HESSELTINE of the Northern Regional Laboratories at Peoria and Dr. STEINKRAUS of Cornell University were already far advanced in studies of food products obtained by traditional fermentation procedures in the Orient and the proposal of this Section would represent duplication.



## **Fermentation Problems in Connection with Water Pollution**

It was felt that this project could be better dealt with by the Section on Water, Sewage, and Industrial Wastes (VI.8). However, Section VI.2 was particularly interested in and concerned by the pollution caused by the waste products of microbiological industries and would offer cooperation, provided that the initiative remained with Section VI.8. Dr. LANGLYKKE would again contact Section VI.8 about this project for possible cooperation.

## **Directory of Research Laboratories in Field of Fermentation**

The meeting was of the general opinion that there was a need for such a Directory covering scientific-, applied- and industrial laboratories, engaged in microbiological research on a worldwide basis, with a brief description of location, staff members, field of activity. Such a directory would be similar to the very valuable volume *Industrial Research Laboratories of the USA*. The project should be given to a publishing house with Members of Section VI.2 serving as advisers and as consultants. Though the project was not encouraged by IUPAC authorities, it was decided that it should again be proposed.

## **Education in Bioengineering**

No report had been received from the Committee consisting of Profs. FIECHTER and PIRT. It was stressed that at present the international interpretation of what a bioengineer is or should be was highly confused. Required courses vary widely and an employer had no assurance of a sound background. It was agreed that there should be internationally accepted minimal standards for the basic education of a bioengineer. The Committee was given the task of recommending a minimal education curriculum leading to the degree of bioengineer. The Committee would contact all university centers throughout the world offering instruction in bioengineering and would ask for their curricula. Prof. FIECHTER would coordinate this activity and would prepare a first draft of minimal educational requirements for presentation at the next meeting.

## **Glossary of Terms and Symbols used in Fermentation Literature**

No report was received from Mr. BRONN. However, mention was made that he had already assembled many terms and symbols. Dr. ERTOLA was willing to join this Committee and would contact Mr. BRONN in order to learn what had already been accomplished and what further should be done.

## **Future Activities**

(1) Acad. MÁLEK pointed out that it would be highly advisable to have a better knowledge of the activities of other organizations interested in industrial microbiology and that a better mutual cooperation would be desirable. Was the Section fully informed of their activities and do they know what its projects are? Much unnecessary duplication could be avoided if a better degree of collaboration could be obtained with other organizations working in related fields. Examples of organizations interested in similar fields to Section VI.2 included:

- (a) Certain Sections of the Applied Chemistry Division of IUPAC
- (b) National Societies such as:
  - Society for Industrial Microbiology
  - Society of Chemical Industry, Microbiological Section
  - American Chemical Society, Division of Microbial Chemistry and Technology
  - American Society for Microbiology, Agricultural and Industrial Division
- (c) International Societies and Organizations:
  - United Nations Industrial Development Organization
  - International Cell Research Organization, Panel on Microbiology  
Sec.: DE LA RIVIERE, Delft; Chairm.: PORTER, Iowa City
  - ICSU Scientific Committee on Problems of Environment  
Convenor: SMITH, Plymouth
  - International Association of Microbiology Societies, Economic and Applied Microbiology Section (EAM)  
Pres.: TERUI, Osaka; Sec.: HUMPHREY, Pennsylvania
  - International Organization for Bioengineering and Biotechnology  
Sec.: GYLLENBERG, Helsinki.

Dr. HOOGERHEIDE was asked to prepare the draft of a Circular (news-letter) outlining what Section VI.2 was doing. Furthermore, he would contact its Members asking them, whether in their respective countries there were organizations working in similar fields and what were their projects.

(2) Dr. ERTOLA would make a survey of the Institutes, Organizations, and Industrial Laboratories in the Latin American Countries active in the field of industrial microbiology, mentioning their projects and fields of interest. Very little was known of these activities.

(3) Dr. KINOSHITA would make a survey of the unused resources of developing countries (such as molasses, beer yeast, manioc, dates, *etc.*), products which could be used as raw material for microbiological transfer to valuable products such as alcohol fodder yeast, *etc.* He would contact PAG in order to inquire whether they possess information on this matter.

(4) Acad. MÁLEK, Member of the Advisory Committee to EAM, was appointed liaison representative to EAM from the Fermentation Industries Section.

### **Next Meeting**

This would be held during the XXVIth IUPAC Conference at Washington, DC, between 15 and 24th July (preferably 17 and 18th July). The following year (1972) the meeting should be held in Japan, coinciding with the IVth International Fermentation Symposium (19-25 March).

J. C. HOOGERHEIDE

## **COMMISSION ON SPECTROCHEMICAL AND OTHER OPTICAL PROCEDURES FOR ANALYSIS**

**Dortmund, 26-29 August 1970**

The Commission met at the Institut für Spektrochemie und Angewandte Spektroskopie, Dortmund, Germany. The primary purpose of this extraordinary session was to complete the two important tasks discussed below.

The Commission Members present were the following: Prof. H. KAISER (Chairman), Prof. V. A. FASSEL (Secretary), Prof. C. TH. J. ALKEMADE, Mr. K. M. BILLS, Dr. A. KVALHEIM, Dr. A. C. MENZIES, Dr. J. P. ROBIN, Dr. I. RUBEŠKA, Dr. A. STRASHEIM. Dr. MASSMANN was present for part of the discussions.

### **Actions Taken**

The comments received as a result of the distribution of the tentative nomenclature document entitled *Nomenclature, Symbols, Units and Their Usage in Spectrochemical Analysis—Part I* were reviewed and appropriate revisions were made in the text. The final version of this document could now be assembled for submission to the Analytical Chemistry Division for approval and publication.

The main purpose of the meeting was a detailed and critical discussion of the first draft of the document *Nomenclature, Symbols, Units and Their Usage in Flame Atomic Absorption, Emission, and Fluorescence Spectroscopy*. The Task Group responsible for the preparation of this document was chaired by Prof. ALKEMADE. The present plans were to submit a draft of the tentative document to the IUPAC Secretariat at the XXVth IUPAC Conference in July 1971 for distribution to National Adhering Organizations, other nomenclature groups, professional scientists, and interested individuals for criticism and comments.

V. A. FASSEL

## **COMMISSION ON NOMENCLATURE OF ORGANIC CHEMISTRY (III.1)**

**Oosterbeek, 29 August-5 September 1970**

The Commission reviewed documents for inclusion in Section D of *Nomenclature of Organic Chemistry* (coordination compounds, organometallic compounds, organophosphorus compounds, -arsenic, -antimony, and -bismuth compounds, organoboron compounds, organosilicon compounds, and chains and rings). It was decided to put these documents into final form for publication as tentative rules and for this purpose a Drafting Committee (P. E. VERKADE; K. A. JENSEN; L. C. CROSS, Secretary) was appointed.

Amongst other topics considered were those on the nomenclature of carbohydrates, carotenoids, steroids, natural products, cyclitols, alkaloids, diterpenes, isotopically labelled compounds, tocopherols, and new nomenclature systems.

It was planned to hold the next meeting of Commission III.1 in Washington, DC from 15th to 20th July, 1971.

S. P. KLESNEY

## **COMMISSION ON MICROCHEMICAL TECHNIQUES AND TRACE ANALYSIS**

**Graz, 5 September 1970**

*Present:* Dr. W. SCHÖNIGER (Chairman), Dr. R. LÉVY (Secretary), Prof. K. L. CHENG, Dr. G. INGRAM, Dr. O. G. KOCH—Titular Members; Dr. S. GOMIŠČEK, Dr. A. M. G. MACDONALD, Prof. H. MALISSA—Associate Members.



**Study on Accuracy and Precision of Methods for  
Determination of Carbon and Hydrogen in Organic  
Compounds**

(Project Leader: LÉVY)

This report was approved by the Division Committee in April 1970. The Commission wished this report to be published in the shortest possible time so that it should not become out-of-date. Reprints should be given free of charge to all contributors; if they were too expensive, they should be sold to them at a reduced price.

**Study on Accuracy and Precision of Determination of  
Fluorine in Organic Compounds**

(Project leader: MACDONALD)

A copy of Dr. MACDONALD's letter concerning the second stage of the study (determination of fluorine in a set of compounds of approximately known fluorine content with the use of definite methods for decomposition and fluoride determination) was discussed. There were no objections from those Members of the Commission present. So far 20 microanalysts had already indicated their willingness to cooperate. The full report was expected to be ready in January 1971.

**Study on Accuracy and Precision of Nitrogen  
Determinations in Organic Compounds**

(Project leader: VEČEŘA)

Prof. VEČEŘA had sent a report which was received only after the Commission meeting was completed.

**Study on Accuracy and Precision of Carbon and  
Hydrogen Determinations in Organic Compounds  
containing Heteroelements**

(Project leader: GEL'MAN)

In the absence of Dr. GEL'MAN, Dr. LÉVY communicated to the Members of the Commission a copy of the letter which she had sent to microanalysts willing to cooperate in the second stage of the study (carrying out micro-determinations on test substances) and the corresponding program. The deadline for sending the results was fixed as 1st December 1970, but the Commission feared that this might be too early.

**Study on Accuracy and Precision of Determination of  
Metals in Organic Compounds excluding Simple Residue  
Determinations**

(Project leader: INGRAM)

Dr. INGRAM found it difficult to obtain test substances in a high state of purity and in suitable amounts. He had only got 5 of them. He expected this project to be completed by June 1971. The Commission approved Dr. INGRAM's preliminary report as summed up in the Commission Status Report of July 1970.



### **Study on Mass Absorption Coefficients used in Electron-beam Microanalysis**

(Project leader: MALISSA)

Prof. MALISSA presented a report which the Commission approved.

### **Study on Purification of Chemicals used for Micro and Trace Analysis**

(Project leader: O. G. KOCH)

The Commission approved the draft report by Dr. KOCH. It would be submitted for final approval to the Division Committee.

### **Expression of Errors in Organic Analysis**

(Project leader: MACDONALD)

This project which the Commission adopted in Cortina d'Ampezzo had been temporarily given up for lack of a leader. Dr. MACDONALD agreed to take it over and would prepare basic recommendations which could be discussed with the interested Members of the Commission and presented for publication to the XXVIth IUPAC Conference in Washington (July 1971).

### **Trace Analysis Applicable to Determination of Minor Amounts of Impurities in High-grade Chemicals**

(Project leader: PINTA)

When the results of the preliminary enquiry which constituted the first stage of this study were known through Dr. PINTA, they would be submitted to the Division Committee so that it may be decided whether the second stage (experimental work) could be started; in that case the limits of this work should be narrow. This decision should be reached before the XXVIth IUPAC Conference in Washington. Mr. FENNELL would be asked to fix the deadline for this transmission to the Division Committee.

### **Study of Trace Impurities in Oxygen and Helium**

(Project leader: CHENG)

Prof. CHENG told the Commission that he had received 30 answers to his questionnaire (see Status Report July 1970) and Prof. MORRISON would help him in the future. The Commission agreed with the proposals of Prof. CHENG (see Status Report July 1970), but decided not to include in the project the purification of oxygen and helium from their impurities and to study exclusively the analysis of these trace impurities. The Commission drew the attention of Prof. CHENG to the fact that he should not include any personal research work within this project.

### **Preparation of XXVIth IUPAC Conference**

The Commission decided to emphasize trace analysis in the future and to propose an expert in this branch as Chairman of the Commission to take the place of Dr. SCHÖNIGER who would have then finished his term of Office. The Commission Members were also invited to propose a new Secretary and, as necessary, new Titular Members.

W. SCHÖNIGER  
R. LÉVY

## SECTION ON FOOD

Leiden, 14-16 September 1970

*Present:* Dr. H. EGAN (Chairman), Dr. H. FISCHBACH, Dr. N. R. JONES, Dr. R. MARCUSE, Dr. B. L. OSER, Prof. J. F. REITH, Prof. R. TRUHAUT, Dr. H. GUTHENBERG, Dr. MERGANTHALER (attending by invitation for Prof. BELITZ), Dr. A. J. COLLINGS (Secretary), Prof. F. PELLERIN (Commission for Analytical Reactions and Reagents) joined the meeting to discuss Item 4. Dr. J. C. HOOGERHEIDE (Section on Fermentation Industries) joined the meeting to discuss Item 5. Dr. A. D. CAMBELL, Dr. G. GRIMMER, Dr. P. KROGH, Dr. I. F. H. PURCHASE, and Dr. A. E. WASSERMAN (Trace Substances Commission) attended the meeting by invitation as Observers.

The meeting opened with Dr. EGAN welcoming the Members and especially those who were attending a meeting of the Food Section for the first time.

1. The minutes of the previous meeting of the Section, held in Cortina d'Ampezzo on 2nd July 1969 had been circulated previously and were approved. Dr. COLLINGS said that as per minute 7, WHO had been invited to comment on the acceptable levels for benzo(a)pyrene in hexane used for food processing; a reply had not so far been received. In reply to Dr. MARCUSE, Dr. EGAN said that Dr. I. BOSUND's name had been forwarded for consideration for Membership of the Division Committee but no further information was available on this point.

2. Dr. EGAN reported that Dr. BUSHILL, due to difficulties caused by his residence in Malta, had tendered his resignation as Member and Chairman of the Food Additives and Contaminants Commission. Dr. BUSHILL had also asked to resign earlier but had then agreed to continue, following the death of Prof. A. C. FRAZER. Dr. OSER proposed that a letter be sent to Dr. BUSHILL thanking him for the work he had done. In Dr. BUSHILL's letter of resignation he supported Dr. EGAN's nomination that Dr. R. MARCUSE should be appointed Chairman of the Food Additives and Contaminants Commission. This was duly approved. Dr. EGAN said that with Dr. BUSHILL's resignation a Titular Vacancy was left in the Food Additives and Contaminants Commission and proposed that this should be made available for a new Secretary. Dr. MARCUSE proposed and Dr. COLLINGS seconded that Dr. GUTHENBERG should be invited to take over the Secretaryship of the Commission on a date convenient to both Dr. COLLINGS and Dr. GUTHENBERG but before the 1971 meeting of the Section. This was unanimously approved.

3. Apologies for absence were received from Prof. H. D. BELITZ, Dr. C. L. CUTTING, Dr. A. EDHBORG, Dr. K. KOJIMA.

4. Dr. EGAN reminded the Committee that about 43/47 methods for the analysis for purity of certain food additives had been drawn up by IUPAC under the terms of a contract with CEE in 1968. A further 17 methods were dealt with in 1969 under a similar contract, which was renewed annually. To progress these and similar matters IUPAC had formed a Coordinating Committee on Analytical Methods, with Prof. TRUHAUT as the Chairman, which reported through the IUPAC Executive Committee to the IUPAC Bureau. At the Cortina meeting in 1969, the Coordinating Committee agreed to a proposal that the Food Section and the Commission on Analytical Reactions and Reagents Commission of the Analytical Chemistry Division should form a Joint Working Group to advise the Coordinating Committee on the *selection* of methods for evaluation under any future IUPAC-CEE contracts. These relationships are set out diagrammatically in Appendix A.



Prof. R. BELCHER, Chairman of the Commission on Analytical Reactions and Reagents, Analytical Chemistry Division, was Chairman of the Joint Working Group. The other Members were Prof. PELLERIN, Dr. EGAN, Dr. MARCUSE, and Dr. OSER. The proposed procedure for the selection of methods for elaboration was set out in a memorandum dated December 1969 (Appendix B) and provided for (a) the Coordinating Committee to state the requirements (e.g., IUPAC-CEE contract), (b) joint evaluation of the methods called for by the Food Section and the Analytical Chemistry Division, (c) submission of the methods to the Coordinating Committee. The evaluation procedure between the Food Section and the Analytical Chemistry Division had been agreed by the Joint Working Group and was also set out briefly in the document of December 1969. For the IUPAC-CEE contract the initiative for selecting the methods to be evaluated lay with the Food Section, which also proposed the individual methods called for. These were then sent to the Analytical Chemistry Division, which considered, in particular, points of theory, nomenclature, practical evaluation, *etc.*, and a final version agreed between the two parties. Under the 1970 IUPAC-CEE contract, IUPAC was to supply at least a further 10 methods to CEE by 1st December 1970. In fact, the Food Section had proposed 27 methods, for the purity of antioxidant adjuncts, and had felt free to offer any number in excess of 10 up to the full 27. Twenty methods had in fact been selected for fuller consideration, and details of these had been sent to the Commission on Analytical Reactions and Reagents. In addition, it would also consider certain past methods, 'lost' earlier in earlier contracts, for inclusion in the 1970 contract methods.

Prof. PELLERIN reported that the 20 methods were acceptable to the Commission but considered that general methods should be included for chloride, sulphate. It was *agreed* that the methods for chloride and sulphate of the *European Pharmacopoeia* should be used as general methods. Dr. EGAN referred to 9 additional methods from previous years which had also been considered for inclusion in the 1970 contract. However, they had been processed in the period prior to the formation of the Joint Working Party. Prof. PELLERIN commented that the Karl Fischer method for water was a general technique and should be considered as such. It was resolved that the 9 methods should be revised in the light of further comments received since their circulation, and that a selection of the revised methods as agreed at the meeting, should be sent to members of the Food Section for comment by 31st October 1970. Prof. REITH commented that the use of benzene in the methods for lecithin was potentially hazardous. It was resolved that in the preamble to the methods a note should be included saying that due caution must be taken with such reagents.

Dr. EGAN further reported that the original documentary basis for the 1966 IUPAC-CEE contract was becoming unworkable and that a new basis should be considered for any future contract. It had been proposed that any 1971 contract should be concerned with the various methods which had been submitted in previous years and that these should be brought up-to-date, as indicated in the minutes of the meeting of the Coordinating Committee held on 9th May 1970 (Appendix C). Prof. TRUHAUT reported that in the 1971 contract IUPAC was required to supply 20 new methods; however, an upgraded old method would be regarded as a new method. Prof. TRUHAUT also reported that there would be a meeting between IUPAC and CEE to discuss this work and that he and Dr. EGAN would be attending.

On the question of publication of the methods, Prof. TRUHAUT said that this must be firstly in the CEE Journal; authorization would then have to be

obtained before they were published elsewhere. It was anticipated that such authorization would be given readily.

5. Dr. HOOGERHEIDE, Secretary of the Fermentation Industries Section of the Applied Chemistry Division, reported that his Section were involved in the evaluation of single cell protein derived from petroleum sources. This presented a number of analytical problems in food chemistry and the help of the Food Section was requested. It was agreed that such problems were within the area of interest of the Food Section and that a Joint Working Party should be set up between the Food Section and the Fermentation Industries Section to examine them in greater detail. Dr. JONES and Dr. OSER agreed to serve on this Joint Working Party; Dr. HOOGERHEIDE agreed to arrange for the nomination of Members from his Section. It was agreed that contact with the Protein Advisory Board of FAO/WHO was desirable and that a joint meeting of the Committees of the two Sections should be arranged for Washington in 1971.

6. Dr. EGAN referred to minute 4 of the previous meetings and called for further consideration of the structure of the Section, its Commissions and Sub-Commissions. At the present time the Titular Membership of the Section (10) is virtually identical with that of one of the Commissions whilst the other Commission had only the minimum of Membership in common with the Section: the position was distinctly asymmetrical. The total Titular/Associate Membership was 10. At the same time there was an unusual feature in the Applied Chemistry Division whereby the Sections appeared to be the equivalent of Commissions in other Divisions according to the IUPAC Statutes; Sub-Commissions, presumably, were similar to other Commissions. The IUPAC Statutes did not say very much about Sections and clarification would be welcome. The current and future work of the Food Section justified two Commissions. Much of the area in which the Section could perform a useful function lay in the field of applied analysis—trace substances, compositional analyses, contaminants, environmental hazards, nutrients. It was agreed that it would be desirable in Washington in 1971 to reorganize the two present Commissions so that they divided the work in a more logical and equitable fashion—based tentatively on trace substances and nutrient aspects of food—and to reinforce their Memberships to the extent that each Commission had 6 Titular Members in its own right. Full Commission Membership would be 8, including 2 (probably Chairman and Secretary) from the Section. This proposal would bring the total Titular Membership of the Section and its two Commissions to 20 (8+6+6).

Under this arrangement the Sub-Commissions would become truly ephemeral bodies, each with a specific remit reviewed at least annually, discharged when the mission was completed. Each of the Commissions would arrange, however, as many Sub-Commissions as it felt to be necessary—normally 2-3, perhaps 4—each one consisting of 2 or 3 Commission Members plus 2-4 Associates chosen for their worldwide expertise in the area concerned. Titular Commission Members should be appointed for their *wide* expertise in the general area; Associate Members for their expertise in more specialized areas. The Food Section would still have its own programme, administering the Commissions and Sub-Commissions, furthering IUPAC-CEE interests and similar broad assignments and reporting to the Division.

7. Dr. EGAN also called for further suggestions, by 15th April 1971, for consideration for the programme of the Section, for full discussion at the 1971 meetings. It was agreed that proposals should be well documented and



submitted to the Secretary of the Food Section who would circulate the proposed programme to Members.

8. Dr. EGAN reported that the International Union of Food Science and Technology had been formed in August 1970 and felt that cooperation with IUPAC should be encouraged. Dr. MARCUSE reported that he had discussed this matter with Prof. VAN SYDOW, Secretary General of IUFST, who welcomed such cooperation. At the Cortina meeting of IUPAC, the President of the Applied Chemistry Division, Dr. GALLAY, had proposed that a symposium on *Contribution of Chemistry to Food Supplies* be held. Dr. EGAN considered that such a meeting would present an excellent opportunity for IUPAC to prepare this symposium jointly with IUFST, possibly at Hamburg in 1973. The subjects for the symposium would best be those where the Food Section of IUPAC is most active, *i.e.*, the chemistry of food additives, their specifications and detection in food, analytical approaches to potential and active food contaminants, and the elaboration of chemical indexes of nutrition and other food quality aspects. It was resolved that these proposals should be sent to the Division since it was understood that the symposium would be organized at Division level.

9. Dr. COLLINGS reported briefly to the Section on the current work of the Food Additives and Contaminants Commission. Tentative minimum specifications for 7 extraction solvents used in the food industry had been sent out to industrial manufacturers and users of food-grade solvents for comment. From the replies received an interim report of the Commission was prepared and submitted to the joint FAO/WHO Joint Expert Committee on Food Additives at its meeting in July 1970. This report had now been finalized and, subject to final postal comments by Members of the Commission, would be available for publication in November 1970. The Commission proposed to prepare unified specifications for some dispersion solvents and to look at the present IUPAC methods for the determination of lead and mercury in food and other methods for cadmium, as the 1970-71 programme. It was agreed that the Pesticides Section should be approached at an early stage in this work to avoid any overlap of effort.

10. Dr. FISCHBACH reported briefly on the work of the Trace Substances Commission. The Smoke Constituents Sub-Commission had evaluated the procedure of HOWARD *et al.* [*J. Assoc. Offic. Analyt. Chem.*, **49**, 611-617 (1966)] in a collaborative study and this could now be put forward as a recommended method for the estimation of benzo(a)pyrene. The future work of the Commission would involve a collaborative study of multicomponent polycyclic aromatic hydrocarbon preparations and a preliminary evaluation of nitrosamine assays in current use. It was also proposed to investigate the status of the trace nitrosamine assay developed by HOWARD and if an AOAC collaborative study is planned, to request participation by laboratories of Commission members.

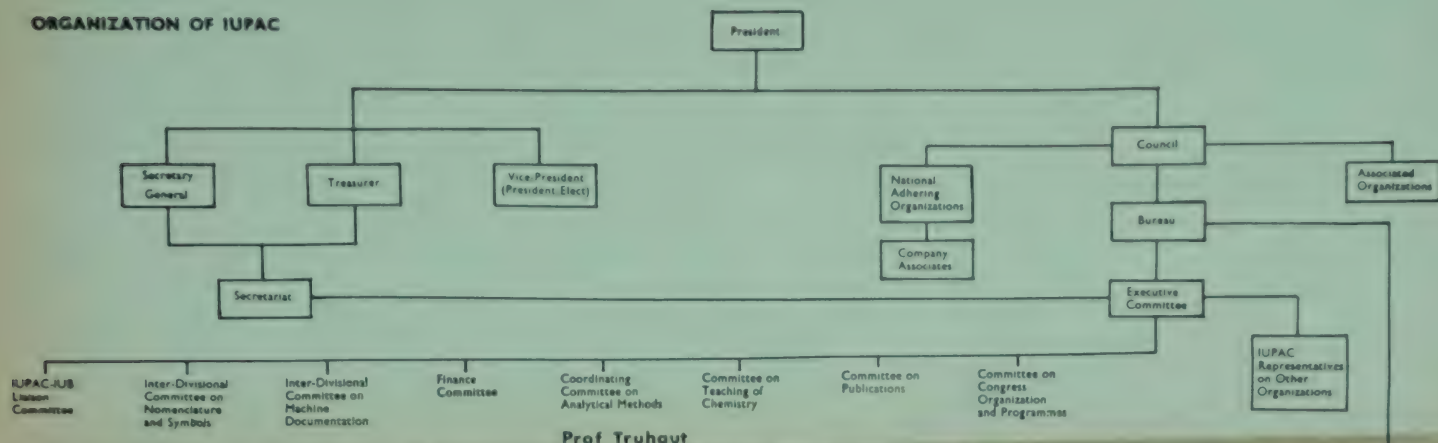
11. Dr. JONES reported briefly on the work of the Mycotoxins Sub-Commission. Preliminary work on the stability of standard Aflatoxins B<sub>1</sub> and G<sub>1</sub> had been completed, together with an IUPAC-sponsored collaborative study of methods for the standardization of aflatoxins and arrangements for publication of this procedure were being made. It was expected that the final methodology would be developed in 1971.

12. *Membership.* Dr. EGAN called for nominations for industry-based Associate Members of the Food Section and presented a letter of support for Dr.

# APPENDIX A

## INTER - RELATIONSHIP BETWEEN THE FOOD SECTION OF IUPAC AND OTHER IUPAC BODIES

### ORGANIZATION OF IUPAC

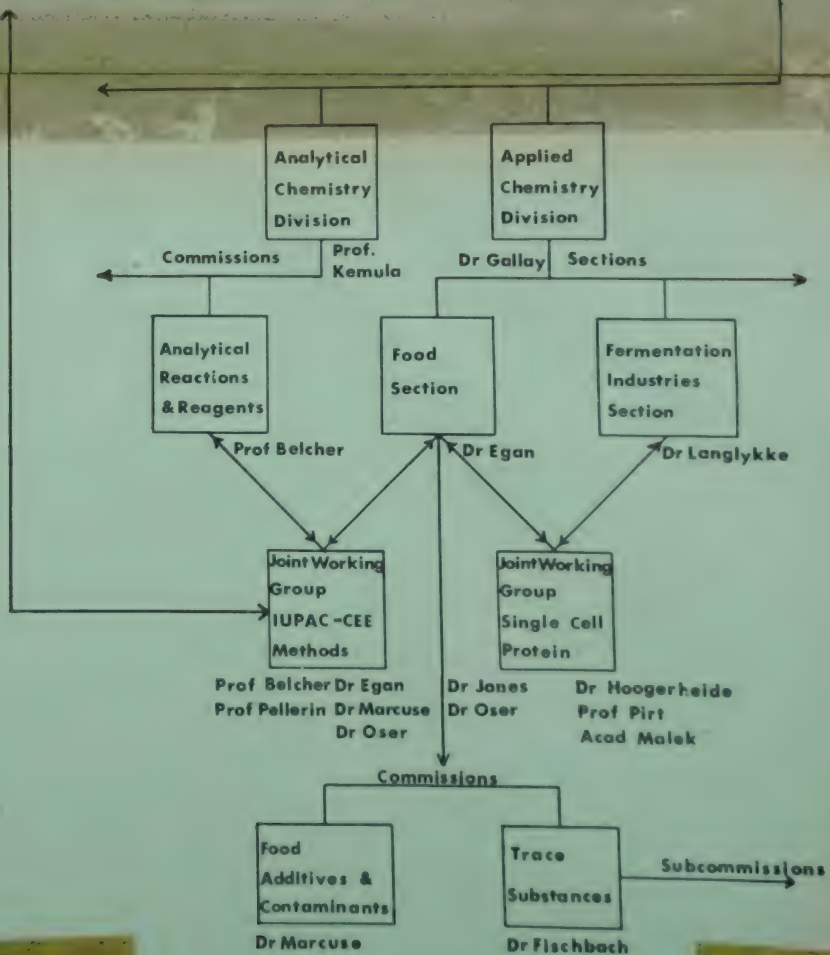


Prof Truhaut

Based on

### ORGANIZATION OF IUPAC

Compte Rendus Cortina 1969







OHNO (Japan) received from Prof. KOJIMA. Dr. OSER also proposed Dr. TANNENBAUM (USA). After discussion it was agreed to support both nominations. Dr. COLLINGS requested information on the tenure of Membership of Associate Members who did no work for the Commissions. Dr. EGAN replied that Associate Membership should be reviewed from time to time in the light of the Section programme; there was no point in continuing the Membership of Associate Members who made no contribution.

13. *Publications.* Dr. COLLINGS reported that the survey of methods for the detection and determination of some food additives in food had been updated and submitted to the President of the Applied Chemistry Division. Subject to his approval it would be published. Dr. JONES enquired as to whether greater publicity could be given to the IUPAC methods. It was agreed that it was desirable that methods developed by the Food Section should be issued, where appropriate, in *IUPAC Information Bulletin* monograph form and that further enquiries would be made accordingly. The reports of the Food Additives and Contaminants and the Trace Substances Commissions also included material which was worth publishing in this way; and IUPAC-CEE methods might also be published in the same form.

14. Dr. EGAN reminded Members that the next meetings of the Food Section, its Commissions and Sub-Commissions would be held in the Mayflower Hotel, Washington, DC, 15-18th July 1971. In closing the meeting he expressed thanks to the Chairmen and Secretaries of the Commissions and Sub-Commissions for their help and to Dr. DEN OS, Royal Netherlands Chemical Society, and Prof. REITH for assistance with local arrangements. Dr. OSER expressed the thanks of the meeting to the Chairman and Secretary of the Section.

A. J. COLLINGS

### **Appendix B: Proposed Mechanism for Selection of IUPAC-CEE Methods of Analysis for Evaluation and Development**

1. Prof. TRUHAUT to decide requirements for the particular phase/contract concerned:

- (a) How many methods?
- (b) Where appropriate, what type of methods (e.g., in the case of IUPAC-CEE contract, what is the list from which choice is to be made)?

2. Prof. TRUHAUT to indicate requirements above to

- (a) Chairman of Analytical Reactions and Reagents Commission
- (b) President of other Division concerned (in the case of the Applied Chemistry Division the Chairman of the *Section* concerned is notified, with copy for the information of the President of the Division) to make (or to agree) choice of methods to be elaborated.

3. The Division (or in the case of the Applied Chemistry Division in the *Section*) concerned, jointly with the Analytical Reactions and Reagents Commission, to elaborate the draft methods chosen.

The mechanism for doing this is to be agreed between the Analytical Reactions and Reagents Commission and the Division/Section concerned. (In the case of IUPAC-CEE contract there is already a Joint Working Group between the Commission and the Food Section for this collaboration.)

4. The draft methods to be forwarded by the Chairman of the Joint Working Group (or other body agreed) to Prof. TRUHAUT for circulation to the Coordinating Committee (and the Presidents originally approached [at 2(b) above] for comment, reference back to Joint Working Group or agreement, as appropriate.

5. The agreed methods to be transmitted onwards by the IUPAC Secretariat as appropriate.

Stage 3 will usually be progressed by the Division (or Section) concerned through its members of a Joint Working Group. This will involve:

- (a) circulation of the drafts to the full Membership of the Joint Working Group followed by
- (b) circulation of the (corrected) drafts to the full Membership of the Analytical Chemistry Division and of the other Division (or Section) concerned, for comment.

This would normally mean that the initiative for selecting methods from a range of methods [2(b) above], and for proposing specific methods for each item selected, would be taken by the Division (or Section) or its representatives in the Joint Working Group concerned. The choice and the specific proposals would then be put to the Analytical Chemistry Division or its representatives on the Joint Working Group for comment and agreement. The Analytical Chemistry Division would in particular consider points of analytical principle (theory, nomenclature, etc.).

R. BELCHER  
H. EGAN

### **Appendix C: Minutes of Meeting of Coordinating Committee on Analytical Methods (Paris, 9 May 1970)**

*Present:* Prof. R. TRUHAUT (Chairman), Prof. R. BELCHER, Dr. H. EGAN and Prof. F. PELLERIN. Apologies were received from Dr. R. MORF and Prof. J. ZÝKA.

1. Prof. TRUHAUT explained that the meeting had been arranged to give preliminary consideration to proposals to any 1971 IUPAC-CEE contract which might be drawn up, in the light of experience of IUPAC-CEE contracts to date. Prof. BELCHER and Dr. EGAN said that they welcomed this opportunity since, whilst previous contracts had now been progressed and a satisfactory liaison worked out between Coordinating Committee, the Food Section of the Applied Chemistry Division and the Commission on Analytical Reactions and Reagents of the Analytical Chemistry Division, the original 1966 CEE document 6931/VO/66-F on which the choice of methods for evaluation under successive contracts was still based, was becoming less satisfactory. Dr. EGAN said that he felt it desirable for any future contract to be based on much more precise requirements, flexible enough to permit these to be related to changing priorities from year to year; and that it seemed desirable in some

way to link the financial aspects of the contract to some manifest IUPAC interest, *e.g.*, the ultimate publication of a compendium of methods.

2. Prof. TRUHAUT recounted briefly the historical background to the CEE document 6931/VO/66-F, which had originally been drafted by Madame DORMAL-VAN DEN BRUEL following the establishment by CEE of positive lists of permitted food additives and of criteria of purity for these additives. These various criteria remained unchanged. He also referred to the preliminary assembly of related scientific documents which he had made for IUPAC in 1965, and which he believed might now be located in Zürich.

3. IUPAC had subsequently, in successive IUPAC-CEE contracts, prepared a number of methods of analysis suitable for use in enforcing the purity criteria. These were:

- (a) 43/47 methods in 1967—Prof. TRUHAUT explained that CEE had now asked Madame Demine to look at these and hoped to report by mid-June 1970;
- (b) 17 methods (of which 11 were still not in final form) in 1969;
- (c) a selection from 27 methods currently being progressed under the 1970 contract.

With the selection currently being progressed under (c) it was proposed to include a further nine methods (those originally numbered 1, 3, 4, 12, 13, 14, 18, 19, 28) which had been 'lost' in 1969. It was agreed that it was desirable to translate into English methods at present in French, German, or Italian.

4. In a full discussion of the various groups of methods indicated in Minute 3 above it was recognized that IUPAC had played a very full part in selecting and developing these. However, it was understood that the CEE Scientific Commission had not yet had any opportunity of considering any of these methods. Taking into account the diminishing value of the original CEE document as a basis for future contracts and the need for CEE to evaluate the IUPAC methods so far received, it was considered better in any 1971 IUPAC-CEE contract to help CEE in finalizing for publication all of the IUPAC methods then received, leaving CEE a full opportunity to consider which methods still remained from the 1966 document for evaluation and perhaps to prepare a more realistic basis on which to negotiate any 1972 contract. In support of this view Prof. TRUHAUT drew attention to the fact that IUPAC had already for each successive contract put forward more than the minimum of 10 methods required; and undertook to make informal enquiries of CEE.

5. Regarding final publication of the methods under the contracts to date, this would almost certainly be exclusively in the CEE Journal. However, the question of collective republication by IUPAC appeared to be desirable. It was agreed to request the IUPAC Bureau to consider setting aside some proportion of the IUPAC-CEE contract money for republication in this way; or alternatively, to consider discussing with CEE some alternative form of publication which could be available to all interested in methods of analysis for criteria of purity of food additives, perhaps similar to that already established by IUPAC for methods of analysis for fats and oils.

6. Prof. PELLERIN agreed to combine comments on the 1970 methods now being received [Minute 3(c) above] and finally due by 15th June 1970. Dr. EGAN agreed to put into final form the eleven 1969 methods still requiring this [Minute 3(b) above], viz: Nos. 2A/B, 4, 5, 6, 7, 8, 9, 11, 15, 16. It was agreed that it would be desirable that Prof. PELLERIN attend the Food Section



meetings in Leiden, 14-16th October 1970, and that authority should be sought accordingly.

7. It was agreed to retain an annual numbering system: -/68, -/69, -/70, pending final CEE evaluation, after which it was recommended that a new functionally based system:

- 1-99      general purity criteria
- 100-199 food colours
- 200-299 preservatives
- 300-399 antioxidants
- 400-499 emulsifiers and stabilizers

as originally suggested by Prof. TRUHAUT, should be adopted.

H. EGAN

## SECTION ON PESTICIDES (VI.5)

**Ehrbach/Rheingau, 14-18 September 1970**

1. The Chairman thanked Messrs. C. H. Boehringer Sohn for their hospitality and especially Prof. JERCHEL and Dr. LEBER. The Chairman also welcomed Guests and Observers, and expressed the Section's pleasure at the growing collaboration and exchange of information with these agencies.
2. The Chairman welcomed Dr. K. FUKUNAGA (Japan) to his Titular Membership in the Section.
3. The Minutes of the 1969 Meeting were approved.
4. Dr. RESNICK reported on the progress of preparations for the *IIInd International Pesticide Chemistry Congress* in Tel-Aviv, Israel: 21-27th February 1971.
5. Dr. HURTIG reported on progress of preparations for the *International Symposium on Pesticide Terminal Residues* (17-19th February 1971), which would be held in conjunction with the *IIInd International Pesticide Chemistry Congress* in Tel-Aviv. Dr. FREED's deadline to reply with his proposals for organization of the symposium on herbicide terminal residues was 18th September: Dr. KEARNEY would be invited to replace Dr. FREED.
6. The Section discussed at some length the problems associated with ICSU Programmes on the Human Environment and IUPAC involvement in SCOPE. It was the view of the Section that the IUPAC Bureau, meeting in Vienna at the end of the month, should be approached through a letter to the President of the Division, reporting to him the views of this Section in deploring the apparent lack of action to appoint the *ad-hoc* Committee as agreed upon at the Division meeting in Cortina d'Ampezzo in 1969. It was understood that Dr. R. A. E. GALLEY should have been a Member of this Committee but he had not yet been informed of his appointment. The Chairman was authorized to draft and send this letter to the Division President in Vienna.

## 7. Policy of Work of Commissions

(a) *Communication with FAO/WHO Joint Meeting on Pesticides Residues.* The monographs on individual pesticides developed by FAO/WHO JMPR contain the background information on pesticide metabolism, residue identification and measurements which lead to the requests for IUPAC to develop information defined as necessary. The monographs and reports of JMPR had not been available to this Section or its two Commissions at the time of the annual meetings of the Section in 1969 nor 1970. In order to resolve this problem the Section decided to request FAO/WHO to provide advance drafts of monographs and reports, on a confidential basis, for dispatch to Titular and Associate Members assigned responsibility for particular problems. It would be recommended to FAO/WHO that these draft documents be sent through the IUPAC Secretariat for transmission to the Chairman of the Section and Secretaries of the two Commissions for allocation to Titular and Associate Members.

(b) *Relations with Codex Committee on Pesticides Residues.* The Section took note of Sections 153, 154 and 155 of the 1969 report of CCPR. The Section held two Meetings with Dr. KRUYSE, Chairman of CCPR, to discuss the best ways of achieving closer collaboration with CCPR. The specific needs of CCPR with regard to development of analytical methods to accommodate the international tolerances, proposed by CCPR, were discussed at length. It was agreed that in order to speed communications between CCPR and this Section, the Chairman of CCPR would request the Codex Secretariat in Rome to send officially a copy of the CCPR Reports to the Chairman of this Section.

Dr. KRUYSE expressed his opinion that it would be useful for the Commission on Pesticide Residue Analysis (VI.5.2) also to review available data on residues in various commodities moving in international trade and to evaluate the published figures as to statistical reliability, and also evaluate methods of analysis used to develop these data. Dr. KRUYSE expressed the view that IUPAC could help the Codex in recommending methods of analysis. Dr. HURTIG developed the concept that CCPR should define for us a few priorities from the current requirements. The Section agreed that this would be desirable, if possible, at the 1970 CCPR Meeting.

During the discussions, Dr. KRUYSE also clearly stated that other international organizations, besides IUPAC, would be advised to send in proposals for methods of analysis. This was endorsed by the Section.

(c) *Communication and Collaboration with European Economic Community.* The Chairman particularly welcomed the participation of Dr. S. DORMAL-VAN DEN BRUEL and Dr. F. GEISS, representing CEE, in the discussions of the Section and its Commissions. An outline of priorities for regulatory methods of analysis for pesticide residues in food as done by the CEE working groups was presented. Considerable discussion of some specialized aspects was developed in the Commission VI.5.2 Meeting. It was mutually recognized by the Section and CEE representatives that an exchange of information on work in progress in IUPAC and CEE would be welcomed, and that collaboration should be developed between Commission VI.5.2 and the CEE Committee on Analytical Methods for Pesticide Residues. The ultimate objective for this liaison and collaboration was to develop recommendations for methods of pesticide residue analysis that could be acceptable to the member countries of the Codex Alimentarius Commission and CEE simultaneously. The Chairman would pursue the matter further in order to initiate an exchange of information on current projects.

(d) *Relations with Organization for Economic Cooperation and Development.* The Section took note of the Summary Report submitted by OECD to this Section, containing information on OECD work and programmes in the field of pesticide residues. The work developed in our Commission on Terminal Pesticide Residues (VI.5.1) on hydrophilic metabolites of the cyclodiene insecticides and lindane, and the discussions of Commission VI.5.2 on methods of analysis for these metabolites would be transmitted to OECD as a partial reply for their request of assistance from us.

(e) *Relations with Joint FAO/IAEA Programmes.* The Section heard a report from a representative of the Joint Division of FAO/IAEA on future programmes relating to the use of radiometric techniques in pesticide chemistry and the desire of this Division for close collaboration with this Section. The Division was scheduling a meeting of a panel of experts in Vienna on *Pesticide Residues and Dietary Habits* and had asked our Section to send an official Observer. The Section decided to designate Dr. H. FREHSE for this purpose. The Section also noted that the Secretary of the Section, Dr. CH. RESNICK, would participate in this panel in a private expert capacity.

(f) *Relations with COMECON.* The Section decided to authorize the Chairman to request the Secretary General of COMECON in Moscow to designate a representative of the COMECON Scientific Committee to attend as an Observer at the future meetings of our Commissions.

## **8. Memberships Expiring in 1972**

The Section took note that in 1971 the terms of office of several Titular Members expired. The Chairman would write to all Members for advice on how best to deal with this problem.

## **9. Organochlorine Chemicals**

Prof. WIDMARK discussed problems connected with the chemistry of organochlorine compounds and the acute need for information on the presence of these chemicals in the environment. It was suggested that a machinery should be established within IUPAC for the identification and measurement of the various organochlorine chemicals, and not only pesticides, in the environment. The Section felt that IUPAC, being the world body of chemistry, should take the leadership in providing reliable analytical methods and the necessary information on the overall chemical quality of the environment. It was decided that the Chairman should bring the views of the Section on this matter to the attention of the Bureau, through the President of the Division, and request a statement on IUPAC policy towards this problem.

## **10. Dioxin Chemistry**

The Section heard reports on the present status of our knowledge with regard to dioxin chemistry by Mr. COOK on work done on this subject by US Food and Drug Administration, by Dr. HILL on work done by the US Department of Agriculture and by Dr. KENAGA on work done by Dow Chemicals Co. (USA). There was a great deal of concern with regard to the chlorinated dioxins due to their highly toxic nature and tetraarogenic effects in



certain animals. The presence of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in several batches of technical 2,4,5-T had led to certain restrictions in the use of this herbicide. The Section heard the above-mentioned reports on current studies in which a number of the polychlorodioxins have been synthesized for analytical and toxicological studies; methods of analysis have been studied for their use in various kinds of product; stability, translocation, and persistence studies have also been initiated. It was suggested that the Section should continue to review this subject and should request similar information from other countries.

### **11. III International Pesticide Chemistry Congress**

Dr. KOIVISTOINEN reported on preparations now being made in Finland for this Congress, scheduled to be held in early-July 1974. A major feature would be related to problems of environmental chemistry involving pesticides.

### **12. IV International Pesticide Chemistry Congress**

The Chairman asked the Members to start exploring possible sites for this Congress in 1978.

### **13. Statistical Approach for Evaluation of Residue Data for Establishment of Codex Tolerances**

Dr. KRUYSE, Chairman of CCPR, presented a statement on an approach to evolve international pesticide residue tolerances based on statistical evaluation of residue data. The basic idea brought forward by Dr. KRUYSE was that the tolerance should represent an average of the accumulated residue results.

This approach was not new, being the result of one method of statistical treatment of data. It was the understanding of the Section that the views on this subject expressed by Dr. KRUYSE were his personal views in the framework of his responsibility in the Netherlands, namely that residue tolerance should be the *average* of all variations in residue values found at harvest, in trials representing *good agricultural practice*.

A considerable discussion and debate ensued, but it was the consensus of opinion that this problem was a major philosophical point in evolving Codex policy, and that it should be resolved by member countries of CCPR. It was agreed that if CCPR should request the advice of this Section on the matter, it would be pleased to provide it.

### **14. Other Business**

(a) *National Representation on Commissions.* The Section heard details of correspondence from the Executive Secretary of IUPAC on this subject, and decided to request the Bureau to authorize the Section to invite National Representatives to our two Commissions, if the need arises to strengthen the work of the Commissions with regard to requirements of the various international bodies, in particular CCPR and CEE. Dr. HURTIG was authorized to ask the President of the Applied Chemistry Division to obtain authority from the Bureau for this action in principle at Vienna, October 1970, Bureau Meeting, in accordance with IUPAC Statutes and By-laws.

(b) *Section Representation at Joint FAO/WHO Experts Meeting.* The Section asked the Chairman to explore the possibility of appointing an Observer of our Section to the Meetings of the Joint FAO/WHO Group of Experts.

The Chairman was to take the matter up with the President of the Applied Chemistry Division, and if he approved, Dr. HURTIG would put the request to FAO and WHO.

### 15. Arrangements for Next Meeting

The 1971 Meeting of the Section and its two Commissions would take place in Washington, DC (USA) between 15th and 24th July 1971, within the framework of the XXVIth IUPAC Conference.

CH. RESNICK

*Editorial Note.* Reports on the meetings of the Commission on Terminal Pesticide Residues (VI.5.1) and the Commission on Pesticide Residue Analysis (VI.5.2), held simultaneously with the Section on Pesticides in Erbach/Rheingau, will be published in *Information Bulletin* No. 40.

## COMMISSION ON COLLOID AND SURFACE CHEMISTRY (I.6)

Bristol, 24-26 September 1970

*Present:* Prof. D. H. EVERETT (Chairman—UK), Prof. R. L. BURWELL, JR. (USA), Prof. R. HAUL (Germany), Dr. K. J. MYSELS (USA), Prof. G. SCHAY (Hungary), Prof. H. VAN OLPHEN (Secretary—USA)—Titular Members; Dr. S. FRIBERG (Sweden), Prof. C. KEMBALL (UK), Prof. H. LANGE (Germany), Prof. G. A. SCHUIT (Netherlands), Prof. A. SHELUDKO (Bulgaria)—Associate Members; Sir ERIC RIDEAL (UK), Dr. R. H. OTTEWILL (UK), Prof. F. S. STONE (UK)—Observers.

### Introduction

Prof. EVERETT welcomed those attending, and mentioned that Members BARRER, BORESKOV, BRUNAUER, HORIUTI, KAZANSKY, and KISELEV had been unable to come to Bristol because of other commitments. The main purpose of this interim meeting was to discuss comments received on the tentative *Manual of Definitions, Terminology, and Symbols in Colloid and Surface Chemistry* which had been published in January 1970 as Appendix No. 3 to the *IUPAC Information Bulletin*. Hopefully, this discussion would enable the Commission to submit a final version for Council action during the 1971 IUPAC Conference in Washington, DC, after further discussion, both by correspondence, and at the Commission meeting at the Washington Conference. At the same time, those Members who participated in the work of Prof. BURWELL's Sub-Committee on nomenclature for heterogeneous catalysis would be given the opportunity to develop a tentative proposal in that area.

The minutes of the Commission meeting in Cortina d'Ampezzo (1969) were approved.

### I. Tentative Manual on Definitions, Terminology, and Symbols in Colloid and Surface Chemistry

Prof. EVERETT mentioned that the response to the tentative manual had been gratifying. IUPAC had printed 2000 copies which were all distributed, and

some recent requests could not be fulfilled. Many valuable comments had been received and these had been distributed to the Members for study prior to the meeting.

Revisions of the manual based on comments received were formulated and Prof. EVERETT would collect and distribute these new formulations to the Membership. He would solicit further comments from outsiders, as suggested in the discussions, on specific sections, including the following main sections which were not discussed because of lack of time: Section 1.11—Rheology, Section 1.7—Electrochemical double layer, and Section 1.8—Electrokinetics. On Section 1.11 advice would be sought from rheological societies, specifically from the Committee of the British Rheological Society which was developing nomenclature on rheology. On Sections 1.7 and 1.8 the Commission would collaborate with Commission I.3 (Electrochemistry). The Secretary was requested to arrange a joint session with this Commission during the 1971 IUPAC Conference.

## **2. Nomenclature for Heterogeneous Catalysis**

(Discussed by BURWELL, HAUL, KEMBALL, RIDEAL, SCHAY, SCHUIT, STONE).

A proposal circulated by Prof. BURWELL prior to the meeting was discussed. A tentative outline was agreed upon and some of the items were formulated. Assignments were made for the formulation of the other items of the outline.

When a final draft had been prepared, this would be circulated to all Commission Members prior to the 1971 IUPAC Conference.

## **3. Nomenclature for Zeolites and Molecular Sieves**

Prof. EVERETT reported that Prof. BARRER had accepted the invitation to study nomenclature of zeolites and molecular sieves and had organized a small Working Party consisting of the following persons: Dr. D. W. BRECK (USA), Prof. K. E. FISCHER (Germany), Prof. R. L. HAY (USA), Dr. G. T. KERR (USA), Prof. W. M. MEIER (Switzerland), and Prof. S. P. ZHDANOV (USSR) with Prof. A. ÖLANDER (Sweden) representing Commission II.2 (Nomenclature of Inorganic Chemistry) and Dr. M. FLEISCHER representing the Committee on New Minerals and Mineral Names of the International Mineralogical Association.

(*Note:* The Secretary met Prof. BARRER on 1st October. Prof. BARRER had prepared a rather detailed proposal on principles and guidelines for the development of a nomenclature system for these materials. This proposal was discussed with those Members of the Working Party who were attending the International Conference on Zeolites and Molecular Sieves which was held in Worcester, Massachusetts, September 1970. Based on the comments received the proposal would be further developed, by correspondence for the time being.)

## **4. Liaison with CID on Nomenclature**

Prof. LANGE pointed out that the CID Committee on nomenclature is called CIT: Comité International de Terminologie. Prof. EVERETT noted that the interaction between the Commission and CIT is satisfactory. For example,



CIT adopted our definition of Krafft Point, and in other areas of common interest the CIT proposals are in basic agreement with our definitions although the actual descriptions of terms are often slightly different.

## 5. Translation of Nomenclature Rules

The Secretary was requested to enquire about IUPAC policy or guidelines for the translation of final nomenclature manuals into other languages.

## 6. Standardization of Methods and Standard Samples Scheme

(a) *Surface area standards.* The Chairman referred to the initial proposal by Sir ERIC RIDEAL to make available standard reference materials for surface area determination. The availability of such well characterized standard materials would allow comparison of measurement procedures between laboratories, and would serve as calibration standards. The proposal was discussed at the *Symposium on Surface Area Determination* which was held at Bristol in 1969 under sponsorship of the Commission and the British Society of Chemical Industry. Following this Symposium a British effort was initiated by a Working Party consisting of Prof. D. H. EVERETT, Prof. G. D. PARFITT, and Prof. K. S. W. SING, with Dr. C. R. VEALE, representing the National Physical Laboratory. Also on behalf of the Commission, the Working Party submitted a *Proposed Scheme for Surface Area Standards* to the Committee of SCI Colloid and Surface Chemistry Group. The proposal was approved in January 1970.

Prof. EVERETT stated that the Working Party intended to start on a relatively small scale in order to gain experience before launching a broader program. The number of samples would be limited first to 3 or 4 carbon samples, including graphitized carbon, and some 4 silica samples of varying porosity. The cooperation of industrial companies was being sought (*i.e.*, Cabot and Degussa) and contact was established with NPL regarding storage, distribution, and characterization of the materials. It was hoped that in the future other national laboratories would cooperate. With regard to sample size, the Commission Members stressed that the sample size should not be less than 100 kg, and preferably larger.

(b) *Standard catalyst material.* Prof. KEMBALL reported that he had been in contact with the Warren Springs Laboratory of the UK Ministry of Technology where development work was being done on a reference standard sample of a supported platinum catalyst. Prof. KEMBALL would turn over his correspondence with the Laboratory to Prof. EVERETT who agreed to pursue the possibilities of further cooperation in this matter. Prof. SCHUIT stressed the desirability of using single crystal materials for catalysis work but agreed that it is too early to consider development of a standard reference material in single crystal form.

(c) *Pure surfactants.* Dr. MYSELS suggested that the Commission gives attention to the availability of surfactant compounds of high purity. They would, for example, be useful in the study of the interaction between surfactants and proteins. Dr. FRIBERG mentioned that some pure non-ionics are available in Japan, and it was also mentioned that NPL had prepared long chain hydrocarbons which might be used as the starting point for the synthesis of pure

surfactants. Prof. EVERETT emphasized that the need for such materials should be established first, and that criteria for purity should be specified. Although CID would not be primarily interested in fundamental work requiring very pure surfactants, CID might be approached with regard to criteria for surfactant purity.

## **7. Critical Data Compilation in Colloid and Surface Chemistry**

Referring to his review at the Cortina d'Ampezzo meeting, Prof. VAN OLPHEN mentioned that the project on CMC values was now nearing completion. Dr. MYSELS related his experiences in conducting this project with Prof. P. MUKERJEE.

There is still no ongoing activity on data evaluation in the areas of physical adsorption and chemisorption. Prof. BURWELL felt that for data compilation on chemisorption, such as IR spectra of chemisorbed molecules, the time would not be ripe yet. With regard to physical adsorption, the Commission felt that a limited effort concentrating on isotherms for non-porous materials would be of great value and would be manageable. Such evaluated data could best be presented in the form of a critical review. Prof. EVERETT agreed to pursue the matter with Prof. SING, and to look into the possibility of obtaining support from OSTI.

## **8. Educational Activities**

(a) *Work-textbook.* An outline of topics to be covered by the proposed resource book on colloid and surface chemistry was distributed. It was noted that present shifts of emphasis in the subject matter of physical chemistry courses at many universities had resulted in the omission of several topics which had traditionally been taught in these courses, hence, instructors may be expected to be reluctant to introduce topics from the fields of colloid and surface chemistry. Nevertheless, the proposed work-textbook was still endorsed, recognizing that the book would also provide material for individual student assignments.

Several contributions for the book had been received, and a list of potential contributors to the topics given in the outline was distributed. Suggestions for alternative contributors are being solicited. The Commission felt that the selection of authors should be guided by their special expertise and should not be aimed at the widest possible international distribution of authorship.

(b) *Educational films.* The Commission was given a preview of an educational film on colloids which was produced under sponsorship of Unilever. Sir ERIC RIDEAL served as scientific advisor. The Secretary was requested to prepare a list of available films dealing with colloid and surface chemistry topics, to be compiled from national and international catalogues. The Members were requested to supply the Secretary with relevant information on availability of films in their respective countries.

## **9. Environmental Science**

Recognizing that colloid and surface chemistry plays a prominent role in environmental science and technology, it was agreed at the Cortina meeting that the Commission should offer to cooperate with other IUPAC bodies in any endeavour in these areas when appropriate. The Chairman mentioned

that the Commission had received a communication from Prof. R. TRUHAUT, Chairman of Section VI.4 (Toxicology and Industrial Hygiene), indicating that his Section was considering the organization of a symposium on quantitative determination of carcinogens in the environment. It was agreed that this topic was probably too far removed from the interests of the Commission to warrant participation, but the Chairman was requested to keep in touch with Prof. TRUHAUT on this matter.

D. H. EVERETT



# ELECTROCHEMICAL KINETICS

## GUIDELINES FOR DESIGN OF MECHANISTICALLY SIGNIFICANT EXPERIMENTATION

### Commission on Electrochemistry (I.3)

#### I. Context: Current Status of Electrode Kinetics

Rate parameters (*e.g.*, exchange currents, Tafel slopes, *etc.*) are available in the literature for more than three hundred electrode processes. Nevertheless, very few of the relevant mechanisms have ever been conclusively elucidated. This discrepancy is a matter of concern, because the principal *raison d'être* of kinetic research is that it serves as a diagnostic tool for determining the mechanism of reactions.

We feel that research in the field of electrode kinetics would be more likely to receive the attention it deserves, if experiments were judiciously planned to be readily amenable to mechanistic interpretation. With this purpose in mind we should like to make the recommendations listed below.

#### II. Recommendations

We recognize that the planning of kinetic experiments is predicated by certain reasonable hypotheses concerning anticipated mechanisms. This type of *ad-hoc* approach has been very successful in chemical kinetics, and is likely to be more fruitful in elucidating mechanisms than any indiscriminate collection of data. Nevertheless, we feel that the current status of understanding of electrode kinetics warrants the expectation that adherence to the following experimental conditions are likely to yield data amenable to significant interpretation:

1. Purest chemicals should be used, including solvents, supporting electrolytes, electroreactive species, electrode materials, *etc.* The *surface condition* of electrodes (chemical and crystallographic homogeneity, level of contamination, *etc.*) should be well defined.
2. The absence of spurious effects due to contamination should be ascertained.
3. The potential effective at the indicator electrode should be accessible to unambiguous determination (via suitable measurements *versus* a reference electrode, appropriate *iR* drop corrections, the judicious use of *three-electrode systems* and/or Luggin capillaries, *etc.*).
4. Conditions should be judiciously preselected in such a manner that the potential drop across the diffuse double layer be either negligible or accurately known.
5. The current density and potential distribution at the indicator electrode interface should be known.
6. Mass transport (concentration polarization) effects should be either negligible or amenable to accurate quantitative evaluation.
7. Experiments should be performed under isothermal conditions, at accurately known temperatures.
8. An appropriate preselected gaseous supernatant atmosphere (of known composition in terms of prevailing partial pressures, and carefully equilibrated with the relevant electrolyte) should be maintained.

### III. Note

The above text has been approved by the *Commission on Electrochemistry* whose current membership includes: V. S. BAGOTZKY (Moscow, USSR), H. BRUSSET (Paris, France), I. EPELBOIN (Paris, France), A. N. FRUMKIN (Vice-Chairman, Moscow, USSR), H. GERISCHER (Berlin, Germany), R. HAASE (Aachen, Germany), W. J. HAMER (Washington, DC, USA), J. JORDAN (Chairman, University Park, Pennsylvania, USA), E. LEVART (Bellevue, France), G. MILAZZO (Rome, Italy), R. PARSONS (Bristol, UK), A. SANFELD (Brussels, Belgium), R. TAMAMUSHI (Saitama, Japan), H. TANNENBERGER (Geneva, Switzerland), E. YEAGER (Cleveland, Ohio, USA). Comments are invited and should be addressed to the Secretary of the Commission:

Prof. J. KORYTA  
Polarografický Ustav J. Heyrovského  
Ceskoslovenska Akademie Věd  
Optletalova 25, Praha 1  
Czechoslovakia

## REPORTS OF IUPAC-SPONSORED SYMPOSIA

### SYMPOSIUM ON NON-AQUEOUS ELECTROCHEMISTRY

Paris, 8-10 July 1970

The Symposium was sponsored jointly by the Commission on Electrochemistry (I.3) and the Commission on Electroanalytical Chemistry (V.5). After the official opening, at which Profs. G. CHAMPETIER, J. JORDAN, and G. CHARLOT welcomed the participants, the first plenary lecture was delivered by Prof. I. M. KOLTHOFF, Symposium Hon. Chairman, on *A Review of Electrochemistry in Non-aqueous Solvents*.

The main subject of the first day was phenomena of solvation. Two plenary lectures were presented (Prof. H. STREHLOW, Germany; Prof. A. J. PARKER, Australia) and five contributed papers.

On the second day the main subject was organic non-aqueous electrochemistry. Two plenary lectures were presented (Prof. G. CAUQUIS, France; Prof. A. J. BARD, USA) and five contributed papers.

There were three main subjects on the final day—electrochemistry in fused salts (plenary lecture by Prof. B. TRÉMILLON, France, and 3 contributed papers), phenomena of solvation (plenary lecture by Prof. J. J. LAGOWSKI, USA) and organic electrochemistry.

Coverage included organic and mixed solvents, liquid ammonia, and ionic melts at elevated temperature. Sophisticated intercomparisons of acidity and redox potential scales in various solvent systems, critical surveys of interphase distribution properties and imaginative applications of magnetic resonance methods were highlighted.

A simultaneous translation of the lectures (French-English and English-French) allowed the 220 participants from 5 continents (20 countries were represented) to follow the lectures and participate in the discussions.

The 7 plenary lectures will be published in the IUPAC journal, *Pure and Applied Chemistry* [provisionally Vol. 25, No. 2 (1971)]. The contributed papers will appear in a special issue of *Journal of Electroanalytical Chemistry and Interfacial Electrochemistry*.

J. BADOZ-LAMBLING

### V INTERNATIONAL SYMPOSIUM ON CARBOHYDRATE CHEMISTRY

Paris, 17-22 August 1970

This Symposium was organized under the auspices of IUPAC, IUB, Société de Chimie Biologique (France), and Le Groupe d'Etudes des Glucides de la Société Chimique de France.

The eight-member Organizing Committee was presided over by Prof. J.-E. COURTOIS (Faculté de Pharmacie, Paris), with General Secretary Prof. L. MESTER (Institut de Chimie des Substances Naturelles, Gif-sur-Yvette) and Secretary Prof. F. PERCHERON (Faculté de Pharmacie, Paris). The scientific meetings were organised in the Faculté de Pharmacie.



Thirty lectures were given by excellent specialists on the following topics:

- New Applications of Spectroscopic Methods
- Analysis and Synthesis of Glycosidic Linkages in Macromolecules
- New Sugars with Unusual Structure
- Structure of Polysaccharides and Glycopeptides of Biological Interest
- Biosynthesis of Carbohydrates
- Biosynthesis and Enzymatic Degradation of Glycogen

The four main lectures, which will be published in *Pure and Applied Chemistry*, were read by

R. U. LEMIEUX: *Newer Developments in the Conformational Analysis of Carbohydrates*

J. MONTREUIL: *Structural Studies of Isoglycans in Glycoproteins by Chemical and Enzymatic Methods*

L. MESTER: *Carbohydrates involved in Blood Clotting*

K. SCHMID: *Structure and Characterization of Plasma Glycoproteins*

A Special Session was organized on 19th August in the Institut de Chimie des Substances Naturelles at Gif-sur-Yvette in Memory of Prof. M. L. WOLFROM. His work and personality was recalled by Prof. R. L. WHISTLER.

Ten round-table discussions permitted a large and animated confrontation of ideas and opinions between the 340 registered members, coming from 28 countries.

In connection with the Symposium a one-day meeting was devoted to recent developments in the chemistry and biochemistry of trehalose and trehalase (Chairman: Prof. J.-E. COURTOIS).

During the Symposium the members of the International Steering Committee for Symposia in Carbohydrate Chemistry (Present Chairman: Prof. J.-E. COURTOIS, General Secretary: Prof. R. L. WHISTLER) and of the European Committee of Carbohydrate Chemists (Present Chairman: Prof. W. G. OVEREND) discussed current problems.

The VIth International Symposium on Carbohydrate Chemistry will be held in Madison, Wisconsin, USA, in June 1972 (Chairman: Prof. R. L. WHISTLER, General Secretary: Prof. L. ANDERSON).

L. MESTER

## **INTERNATIONAL SYMPOSIUM ON MACROMOLECULES**

**Leiden, 31 August-4 September 1970**

The Symposium was attended by nearly 600 participants from 28 different countries. Besides 14 invited lectures, 270 papers were presented in the sessions of 6 different sections:

- Physical Properties and Thermodynamics of Solutions and Gels
- Polyelectrolytes and Biopolymers
- Properties of Crystalline and Amorphous Polymers
- Morphology of Fibres and Films
- Crystalline and Molecular Structure
- Technical Properties

Although the subject matter was definitely limited to physical and physico-chemical properties of polymers with the exclusion of all chemical reactions, nonetheless the number of papers presented was far too large to be digested by anyone. However, as stated by Prof. STAVERMAN in his opening address, both the number of papers and of participants proves that there is still an urgent need for large symposia besides the micro symposia in which these numbers are stringently limited.

From the point of view of communication between polymer scientists from all over the world the symposium was certainly a success, also due to the excellent facilities provided by the brand new building of lecture rooms at the University of Leiden.

The invited papers will be published in an issue of the IUPAC journal *Pure and Applied Chemistry*:

Prof. P. J. FLORY	Configuration-dependent Properties of Polymer Chains
Prof. A. KATCHALSKY	Physical Chemistry and Biophysics of Polyelectrolytes
Prof. D. HODGKIN	Insulin and Other Molecules—The Extent of Our Knowledge
Prof. E. W. FISCHER	X-ray Small Angle Studies of Phase Transitions in Polymeric and Oligomeric Systems
Prof. G. V. VINOGRADOV	Flow and Rubber Elasticity of Polymeric Systems
Dr. H. BENOIT	Unsolved Problems in Molecular Characterization of Commercial Polymers
Prof. A. ZIABICKI	Molecular Rheology of Polymer Systems
Prof. G. ZERBI	Defect Induced Infrared Absorption
Prof. J. E. HEARST	Physical Properties of DNA
Prof. M. NAGASAWA	Potentiometric Titration and Conformation of Polyelectrolytes and Proteins
Prof. W. H. STOCKMAYER	Statistical Mechanics of Chain Molecules
Prof. L. HOLLIDAY (presented by Dr. J. W. WHITE)	Stiffness of Polymers Related to Some Structure Variables
Prof. A. SILBERBERG	Behavior of Macromolecules at Phase Boundaries

The Organizing Committee, all from the University of Leiden, consisted of Prof. M. MANDEL (Chairman), Dr. J. C. LEYTE, Dr. S. J. ROORDA, Prof. A. J. STAVERMAN, and Dr. M. J. VOORN.

The Scientific Committee consisted of 17 scientists from different towns in the Netherlands.

M. J. VOORN

## VII IUPAC MICROSYMPOSIUM ON MACROMOLECULES: POLYVINYL CHLORIDE— ITS FORMATION AND PROPERTIES

Prague, 7-10 September 1970

The scientific programme of the Microsymposium was divided into four groups (days): (1) Radical Polymerization. Non-Radical Formation. (2) Morphology and Mechanical Properties. Rheology and Plasticization. (3) Solution Properties. Molecular Structure. (4) Destruction.

The individual topics were introduced by the following main lectures:

J. FURUKAWA (Japan): Copolymerization of Vinyl Chloride by Organometallic Compounds

J. UGELSTAD (Norway): Radical Polymerization of Vinyl Chloride. Kinetics and Mechanisms

R. D. ANDREWS (USA): Relation of Mechanical and Optical Properties to Structure of Polyvinyl Chloride

G. PEZZIN (Italy): Rheology and Plasticization of Polyvinyl Chloride

F. A. BOVEY (USA): Configuration, Conformation, and Degradation of Polyvinyl Chloride

A. J. DE VRIES, C. BONNEBAT, and M. CARREGA (France): Dilute Solution Properties and Molecular Characterization of Polyvinyl Chloride

D. BRAUN (German Federal Republic): Degradation of Polyvinyl Chloride

These seven lectures will be published in the IUPAC journal *Pure and Applied Chemistry*. Apart from the main lectures, 53 short communications from the 60 originally announced were also presented.

The Microsymposium aroused great interest, as shown by the high number of participants (210 active participants, 22 of accompanying persons). This can be attributed to the up-to-date character of the program, devoted to a single theme, which, nevertheless, is of considerable industrial importance. Before starting the preliminary work, much time had been spent while trying to decide whether there was any sense in organizing a meeting on topics whose industrial importance would prevent the participants from communicating their findings in full. Indeed, this aspect should not be neglected. However, this Microsymposium has clearly shown that topics of industrial importance attract great attention and that there are many problems worth being presented and discussed. It has already become a tradition with the Prague Microsymposia to stress the importance of thematic discussions, to which eight hours were devoted in the course of the above meeting.

B. SEDLÁČEK

## VI INTERNATIONAL SYMPOSIUM ON MICROTECHNIQUES

Graz, 7-11 September 1970

This Symposium was arranged by the Österreichische Gesellschaft für Mikrochemie und Analytische Chemie (OGMAC) and held under the



auspices of IUPAC. Fachgruppe Radiochemie of the Gesellschaft Deutscher Chemiker and the Verein Österreichischer Chemiker met at the same time. About 650 delegates from 34 countries took part.

The ceremonial opening was in the Graz Opera House. The President of OGMAC, Prof. H. SPITZY (Graz), welcomed the many guests present. The importance of the Symposium was particularly emphasized by the presence of the President of the Republic, the Minister of Science and Research, the President of the Province of Styria and the Mayor of Graz. In a special lecture, the President of the Symposium, Prof. H. MALISSA (Vienna), spoke about the contributions to microchemistry rendered by Austria. The presentation of honours to distinguished scientists from home and abroad concluded the opening session.

The scientific part of the symposium comprised 5 plenary lectures and 188 other lectures. The plenary lectures were given by:

N. E. GEL'MAN (Moscow): Organic Microchemistry

H. FLASCHKA (Atlanta, Georgia): Inorganic Microchemistry

M. T. KELLEY (Oak Ridge, Tennessee): Modern Trends in Radiochemical Analytical Methods

T. S. WEST (London): Determination of Very Small Amounts of Materials by the Techniques of Atomic Absorption and Atomic Fluorescence Spectroscopy

W. SIMON (Zürich): Modern Methods for Elucidation of the Structure of Organic Compounds

and they will be published in the IUPAC journal *Pure and Applied Chemistry*. The other lectures were divided into the following groups:

Group A: Organic Microchemistry (41 lectures)

Group B: Inorganic Microchemistry (59 lectures)

Group C: Microchemical Methods in Biochemistry (23 lectures)

Group D: Micromethods in Teaching and Research (16 lectures)

Group E: Radiochemical Procedures (49 lectures)

In addition, two discussion meetings were held (Organic Elemental Microanalysis: Electron-probe Microanalysis).

All the papers were available in the form of preprints before the Symposium began (four volumes, 1051 pages, Verlag der Wiener Medizinischen Akademie). The scientific programme was complemented by an exhibition held by 20 instrument manufacturers.

The social programme was such as to ensure that personal contact among the participants was increased. The President of the Province of Styria gave a reception in Schloss Eggenberg; the Mayor received the guests at the Schlossberg, and a social evening was held at the Brauhaus Puntigam. In addition, there were informal gatherings of delegates at the beginning and end of the Symposium.

By way of summary one can say that, during the course of this Symposium, a bridge was fashioned between the classical methods of microchemistry founded by EMICH and PREGL in Graz and modern instrumental analysis.

G. KAINZ

## INTERNATIONAL SYMPOSIUM ON CHEMISTRY OF PESTICIDES UNDER METABOLIC AND ENVIRONMENTAL CONDITIONS

Bonn/Birlinghoven, 8-11 September 1970

This Symposium was sponsored by IUPAC and the Gesellschaft Deutscher Chemiker and organized by the Institut für Ökologische Chemie der Gesellschaft für Strahlenforschung mbH München.

In review lectures Dr. H. HURTIG talked about *Significance of Conversion Products and Metabolites of Pesticides in the Environment*, Prof. G. WIDMARK about *Modern Trends in Analytical Chemistry*, Dr. D. ROSEN dealt with *Conversion of Pesticides under Environmental Conditions*, Dr. G. T. BROOKS with *Pathways of Enzymatic Degradation of Pesticides*, Dr. F. MATSUMURA with *Metabolism of Pesticides in Microorganisms and Insects*, and Dr. W. KLEIN with *Metabolism of Pesticides in Higher Plants*.

Twenty-three original contributions concerned themselves with the presence, conversion, and toxicologic properties of pesticides.

In the Final Discussion Dr. HURTIG, Dr. GOTO, and Dr. SALZER talked about *Current Pressing Problems Raised by Pesticides and their Conversion Products in the Environment for the American Continent, Europe and the Far East*.

The review lectures as well as summaries of the original contributions will be published in a new series *Environmental Quality* (G. Thieme Verlag, Stuttgart, and Academic Press, New York). Vol. 1 of this series will appear in January 1971.

W. KLEIN

## II INTERNATIONAL SYMPOSIUM ON SOLID-STATE CHEMISTRY

Rehovot, 14-18 September 1970

Jointly sponsored by IUPAC and IUCr, the Symposium took place in the Weizmann Institute of Science at Rehovot. The 70 or so participants came from 11 countries. Greetings were delivered by A. GUINIER, on behalf of IUCr and G. M. J. SCHMIDT on behalf of the Weizmann Institute.

The meeting was divided into 8 morning and afternoon sessions. Each session consisted of one or two invited papers (1 hour) and 3-5 communications (20 minutes). Adequate time was available for discussion after each paper. The main themes covered were: (1) crystallographic aspects of reactions, including topotaxial growth of products; (2) free radicals and triplet species in solid-state reactions; (3) intra- and inter-molecular energy-transfer, their theoretical interpretation, chemical and spectroscopic consequences, and modes of trapping of energy. Particular emphasis was placed on triplet-excited states and the participants were introduced to the field of thin-film studies; (4) electronic processes in organic crystals with particular interest in proton transfer and charge carrier injection into the crystals; and (5) electronic spectroscopy of molecular crystals.

The invited lecturers were J. Z. GUGLIEMINI, C. A. HUTCHISON, JR., J. JORTNER, R. G. KEPLER, H. KUHN, S. LEACH (who was unfortunately prevented from attending at the last moment), W. MEHL, R. E. MERRIFIELD, S. A. RICE, G. M. J. SCHMIDT, and H. C. WOLF. Their lectures are to be published in the

IUPAC journal *Pure and Applied Chemistry* and as a separate volume by Butterworths. It should provide a good review of the current state of the art.

The last evening was devoted to a panel discussion on *Trends in Organic Solid-state Chemistry*. R. M. HOCHSTRASSER was moderator, with J. JORTNER, G. M. J. SCHMIDT, and C. A. HUTCHISON, JR. being members of the panel. This discussion pointed up both the present strength and weakness of research in this field. All areas covered at the meeting, both theoretical and experimental, are undergoing rapid advances. The weakness lies at the borderlines between the various fields. For example, much has been learned about trapping of energy in ultrapure crystals at very low temperatures, but very little about relatively impure crystals at room temperature, as generally used by the solid-state chemist. An inadequacy of the meeting was undoubtedly absence of participation by those who are studying dislocations in organic crystals. One of the borderline areas in which substantial progress has been made was described by C. A. HUTCHISON, JR.; the study of chemical reactions in suitable crystals by means of EPR and ENDOR spectroscopies has enabled detailed elucidation of the crystal structure of the parent material, of the nature of primary and secondary products, and of the distortion of the parent lattice in the neighbourhood of the reacting species.

One unusual approach is of interest. Using chemical and EPR information on a solid-state decomposition reaction and appropriate interatomic potential functions, J. M. MCBRIDE and his group have written a computer-programme for simulating the detailed movements undergone by each molecule during the reaction. The results were shown as a short film.

This report would be incomplete were it not to mention the talk given by R. BLOCH after the Symposium banquet. Dr. BLOCH, a veteran Israeli industrial chemist, presented in a fascinating way his thesis that the history of the Holy Land was largely determined by the location of the salt deposits in the area.

The Organizing Committee for the Symposium consisted of D. P. CRAIG, R. M. HOCHSTRASSER, J. JORTNER, A. MANY, and G. M. J. SCHMIDT, with the author of this report acting as Secretary.

M. D. COHEN

## **DISCUSSION CONFERENCE ON MACROMOLECULES**

**Marienbad, 14-19 September 1970**

The theme of the first Discussion Conference on Macromolecules was *Models of Biopolymer Structure and Functions*. Sponsored by IUPAC and IUPAB, the Conference was held at Mariánské Lázně (Marienbad near Carlsbad), Czechoslovakia. This Conference was the first of a series of meetings which the Scientific and Organizing Committee of Prague Meetings on Macromolecules (c/o Institute of Macromolecular Chemistry, Prague) intends to devote to various up-to-date, interdisciplinary in the first place, problems of macromolecular science. The meetings are meant as dialogues of the top representatives of various branches of science (having of course a common topic of interest), with the participation of research workers specialized in various disciplines of macromolecular chemistry, physical chemistry, and physics. It is the objective of these Discussion Conferences to expose established facts and interrelationships or rules, together with some more or less substantiated hypotheses, presentation of prospective or controversial theories and experimental observations—all together in order to



stimulate an interest in non-conventional topics, new approaches to existing problems, and a search for analogies in structures, phenomena and functions of macromolecular systems, both known in nature and prepared on purpose.

The programme of the Discussion Conference included 15 main lectures:

A. KATCHALSKY (Israel): Chemicodiffusional Coupling of Active Transport in Biological Membranes

I. TASAKI (USA): Nerve Excitation and Membrane Macromolecules

P. FONG (USA): Mechanism of Brain Memory

P. J. FLORY (USA): Configurational Statistics of Biopolymers

N. V. VOLKENShteIN (USSR): Regulation of Conformational Properties of Proteins by the Electronic Properties of Cofactors

A. SCANU (France): Soluble Lipoproteins as a Model for the Study of Lipid-Protein Interactions

O. C. UHLENBECK (USA): Oligonucleotides as Model Compounds for RNA Structure

G. BERNARDI (France): Mitochondrial DNA and Cytoplasmic 'Petit' Mutation in Yeast: A Physico-chemical Approach to a Genetic Problem

C. SADRON (France): Luminescence of Biological Macromolecules in Solution

G. WEBER (USA): Energy Transfer in Macromolecules

J. L. ONCLEY (USA): Models for Interpretation of Dielectric Data Obtained from Aqueous Macromolecular Systems

C. G. OVERBERGER (USA): A Polar Bonding as a Major Factor in Catalysis of Ester Hydrolysis by Synthetic Macromolecules

H. MORAWETZ (USA): Catalysis in Solution of Synthetic Polymers

O. B. PTITSYN (USSR): Physical Principles of Self-organization of Protein Molecules

A. OPLATKA (Israel): Mechanochemical Aspects of Cell Motility

The participants regretted very much that the lectures announced in the programme could not be presented by A. KATCHALSKY (family reasons), and N. V. VOLKENShteIN and O. B. PTITSYN (non arrival). Their lectures were anticipated with much interest, due both to their subjects and to the opportunity of an interdisciplinary dialogue, allowing a confrontation of various scientific approaches and conceptions. E. SELEGNY (France) was invited additionally to extend his discussion contribution to main lecture (*Kinetics of Transport in Enzymatically Active Model-membranes*).

Besides main lectures, the programme included only discussion contributions (not short communications). What the Organizers had in mind was a combination of discussion contributions prepared in advance (brief presentation of new theories, hypotheses or findings without introduction and details of procedure, common in short communications) with some up-to-date contributions. Despite the fact that not all the authors of the discussion contributions could avoid the clichés of short communications, the discussion (more than 20 hours) was nevertheless a very animated and stimulating one.

The Scientific Committee of the Discussion Conference has recommended that such meetings should be held every two years. The next Conference is expected to have a programme reduced to contain one or two topics only.

B. SEDLÁČEK

# XIII INTERNATIONAL CONFERENCE ON COORDINATION CHEMISTRY

Krakow, 14-16 September 1970

Zakopane, 17-22 September 1970

The Conference was organized by the Polish Academy of Sciences with the cooperation of the Ministry of Education and Ministry of Chemical Industry, under the sponsorship of IUPAC.

The Organizing Committee, consisting of 26 members, was located at the Institute of Chemistry of the University of Wroclaw. Prof. B. JEZOWSKA-TRZEBIATOWSKA acted as Chairman of the Organizing Committee and as President of the Conference.

The aim of the Organizing Committee was to make the Conference a clear picture of achievements in coordination chemistry. Fourteen invited papers—plenary lectures—served this purpose:

- J. C. BAILAR, JR. (USA): Development of Coordination Chemistry in USA
- G. R. CHOPPIN (USA): Structure and Thermodynamics of Lanthanide and Actinide Complexes in Solution
- B. B. CUNNINGHAM (USA): Coordination Chemistry and Physical Properties of Transplutonium Actinide Compounds
- V. GUTMANN (Austria): Coordination and Redox Properties in Solution
- B. JEZOWSKA-TRZEBIATOWSKA (Poland): Theory and Importance of Oxygen Bridge-Bonding
- S. F. A. KETTLE (UK): IR and Raman Spectra of Coordination Compounds
- R. S. NYHOLM (UK): Synthesis, Structure, and Reactions of Metal Olefin Complexes
- R. G. PEARSON (USA): Orbital Symmetry Rules and Mechanism of Inorganic Reactions
- M. A. PORAI-KOSHITS (USSR): Crystal Structure of Transition Metal Complex Compounds with Some Organic Ligands Based on Ethylenediamine and Carbonic Acids
- L. SACCONI (Italy): Conformational and Spin State Interconversions in Transition Metal Complexes
- V. I. SPITSYN (USSR): Development of Coordination Chemistry in USSR
- I. TSUJIKAWA (Japan): Absorption Lines in Transition Metal Complexes
- R. F. FENSKE (USA): Molecular Orbital Theory  $\pi$ -Donor and  $\pi$ -Acceptor Complexes
- K. B. YATZIMIRSKII (USSR): Role of Coordination in Catalytic Redox Processes

These plenary lectures will be published in *Pure and Applied Chemistry*.

The Programme of the Conference was realized in 9 sections:

1. Theory of Bonding in Coordination Compounds
2. Spectroscopy of Coordination Compounds
3. Molecular and Electronic Structure of Lanthanide and Actinide Compounds
4. Crystal Structures of Coordination Compounds
5. Biological and Catalytic Aspects of Coordination Compounds

6. Coordination Compounds with  $\pi$ -Bonding and Metalorganic Compounds
7. New Aspects of Synthesis and Stereochemistry of Coordination Compounds
8. Structure and Thermodynamics of Coordination Compounds in Solutions
9. Mechanism and Kinetics of Chemical Reaction of Coordination Compounds

The choice of section subjects was made so as to give a picture of progress in elucidation of structure and mechanism of reactions in coordination compounds, the growing wide applications, and the newest research methods. To that purpose 31 contributed, invited papers—section lectures—were given.

For the first time at ICCS a huge number of invited papers had been presented, which proved to be a great success and should be continued. Some 391 original contributions were presented at the Conference and 451 were printed in the Conference Proceedings (two volumes of abstracts).

There were 712 participants from 32 countries, which constituted the largest assembly so far in this series of Conferences.

B. JEZOWSKA-TRZEBIATOWSKA

## INTERNATIONAL CONFERENCE ON CHEMICAL POLLUTION AND HUMAN ECOLOGY

Prague, 12-17 October 1970

The main feature of the Conference was a Study Group and Workshop entitled

—Functional Effects of Chemical Substances and the Use of Reference Procedures.

The Study Group linked up with the *International Symposia on Maximum Allowable Concentrations of Toxic Substances in Industry* sponsored by IUPAC and IAOH in Prague in 1959 and in Paris in 1963 and with the symposium *Higher Nervous Functions in Occupational Health* in Prague in 1966. The convening of the Study Group was suggested by the IAOH Sub-Committees for the Study of Higher Nervous Functions and for Maximum Allowable Concentrations and approved by the Permanent Commission of IAOH in Tokyo in September 1969.

In view of the specific nature of experimental toxicological research of functional effects of chemicals (laborious and long-term character of experiments, variety of methods and criteria) the objective of the Study Group was to find ways (1) how to confront methods and (2) for a more effective exchange of information. It was proposed to agree on common reference procedures, as described by M. HORVÁTH and E. FRANTÍK and circulated beforehand to interested laboratories in order to facilitate the discussion. This text was also sent on request as a working document for the Joint ILO/WHO Expert Committee on Occupational Health in 1968 and was discussed at a conference of toxicologists from Socialist countries in Budapest in November 1969.

Twenty active members and 17 discussants participated in the Study Group. The participation of a number of members and discussants was made possible by the financial support of Czechoslovak and foreign institutions. The meeting



was opened and welcomed by Prof. J. TEISINGER, Director of the Institute of Industrial Hygiene and Occupational Diseases in Prague. The introductory address was by Prof. J. CHARVÁT, representative of the UN Advisory Committee for Science and Technology, who outlined the program of this body for the protection of the environment and the program of the forthcoming United Nations Conference in Sweden in 1972. Next, the paper by HORVÁTH and FRANTIK *Experimental Biological Models of Neuro- and Psychotropic Effects of Chemicals* was presented.

In the first half of the week CH. XINTARAS presided, in the second half M. HORVÁTH deputised for the absent I. SANOTSKIJ. The meetings of the Study Group were informal. Tuesday and part of the Wednesday morning were taken up with discussions on (a) use of functional tests in model animal toxicological experiments for determining the effect of acute or longterm exposure to organic solvents, metals, and pesticides; (b) changes in psychomotor performance in man under the action of environmental pollutants, primarily carbon dioxide, and under the influence of drugs. The discussions were based either on short communications (A. DE BRUIN, I. DÉSI, K. HASHIMOTO, P. SILVERMAN, T. SUZUKI, T. VERGIEVA) or on laboratory demonstrations of techniques and/or the presentation of documentary films (J. DVOŘÁK, J. FORMÁNEK, E. FRANTIK, M. HORVÁTH, J. LEWIS, E. LUKÁŠ, A. and H. MIKISKA, G. RABLOCZKI, P. SILVERMAN, M. KRŠIAK).

Further meetings (including part of Wednesday morning) were concerned with the quantitative interpretation of functional tests and the use of reference substances. With reference to the paper of HORVÁTH and FRANTIK, short communications were presented by B. JOHNSON and CH. XINTARAS, I. JANKU, I. NATOFF, G. PLAA, W. H. TEICHNER. Other discussants were: R. R. BEARD, J. GOLDSTEIN, M. HORVÁTH, V. G. LATIES, T. NORSETH, E. PFITZER, S. WEINSTEIN. Some laboratories and individuals, interested in cooperation but unable to attend personally, presented their opinion in writing which was reproduced.

The interpretation of functional tests and the use of reference procedures was also considered in the discussion about the report and recommendations of the Study Group. Some participants mentioned their experience with reference substances, e.g., HORVÁTH and FRANTIK with trichloroethylene, carbon disulphide, amphetamine, allobarbitol and chlorpromazine; LATIES with amphetamine; DÉSI with amphetamine and chlorpromazine; JANKU and KRŠIAK compared the effects of barbitol and chlorpromazine; PLAA had been using tetrachloromethane and other substances for determining relative hepato and nephrotoxicity. WEINSTEIN recommended the use of controlled hypoxemia; HORVÁTH and FRANTIK, like K. E. KLEIN *et al.*, suggested to relate the effect of some substances to the equipotential effect of the blood alcohol level which is critical from the aspect of accidents.

It was agreed that arguments justifying the selection of reference substances would be collected and circulated by an information centre. It was also agreed that in order to ensure standardization always to employ a certain compound manufactured by the same manufacturer who might assist financially this project (IAOH would be approached via the Sub-Committee to deposit funds obtained).

Thursday morning was devoted to the formulation of the recommendation in the Report of the Study Group which was approved by the Study Group on Friday morning. The draft was then submitted to the final Panel Discussion of the Conference on Saturday morning, and a copy given to Prof. R.

TRUHAUT for further discussion with the sponsors of the Conference. On Thursday and Friday mornings Panel Discussions were held on:

- Environmental Lead Exposure: Body Burden and Health Hazard
- Ecological Study of Arsenic Pollution.

The concluding Panel Discussion of the Conference, attended by leading experts, discussed the prevention of chemical environmental pollution from the viewpoint of international hygienic standards and the coordination of toxicological research. Prof. MACÚCH, who presided in the first part, outlined the major problems and reported on the regional program of WHO in Europe. Several contributions were given on ecologic problems of trace elements adaptation, and mutagenic substances. The representative of WHO, A. GILAD, briefly mentioned practical aspects relative to the protection of the environment.

Prof. TRUHAUT, who presided in the second part, reported on the efforts of IAOH, ILO, and WHO to unify data and criteria on permissible levels of occupational exposure, and on the international environmental programs of SCOPE which is to succeed the International Biological Program. After presentation of the Report by the Study Group he expressed his appreciation of the work done and welcomed the proposed program of the Task Group concerning the study of functional effects of chemical agents and reference procedures which fitted into the program of the IAOH Sub-Committee on MAC Values of which he is Chairman. He would submit the Report to the pertinent institutions and include these problems in the agenda of his Sub-Committee at the IAOH Conference in Bulgaria in September 1971. Prof. TRUHAUT stressed that it would be well also to involve further laboratories in addition to members of the Steering Committee. Since the Task Group was also concerned with pollution of the general environment, he would propose the cooperation of this Task Group with SCOPE which plans besides monitoring environmental pollution also the evaluation of its effects and hazard.

Task Group Steering Committee appointed for the first period in accordance with the foregoing Report of the Study Group; K. BATTIG (Switzerland), I. DÉSI (Hungary), G. F. FODOR (Germany), J. GOLDSTEIN (Romania), K. HASHIMOTO (Japan), M. HORVÁTH (Czechoslovakia), G. L. PLAA (Canada), I. V. SANOTSKIJ (USSR), S. A. WEINSTEIN (USA). In the course of 1971 it is proposed to publish in bookform selected contributions on reference procedures in functional toxicity tests as well as a survey of laboratories.

M. HORVÁTH

# REPORTS OF IUPAC REPRESENTATIVES

## XXIII WORLD HEALTH ASSEMBLY

Geneva, 5-22 May 1970

### Introduction

This huge assembly was attended by 520 delegates from 125 of the 131 Member States. Obviously, only a few of the items of the agenda are interesting for chemists. It has also to be noted that practically all of the 131 delegations were eager to take the floor sooner or later and that, consequently, many speeches were held for the great public merely with the intention of utilizing this world forum for political purposes.

In the following report restriction is made to a few items of very general interest, as well as problems pertaining specially to chemistry. The WHA was opened on 5th May in the premises of the United Nations in Geneva (Palais des Nations) by Dr. W. H. STEWART, US Surgeon General, President of the previous Health Assembly held in Boston, USA, in July 1969.

Prof. HIPPOLYTE AYÉ, Minister of Health of the Ivory Coast was elected President. As Vice-Presidents the following were elected: Dr. P. D. MARTINEZ, Mexico, Dr. A. S. EL-MAJALI, Jordan, Mr. S. C. CHUA, Singapore, Dr. D. TUMENDOLGER, Mongolia, Dr. E. AMUNDSEN, Denmark.

### Short Summary of Decisions of the Assembly

(a) *Early warning on drugs.* The WHO pilot project for monitoring adverse reactions to drugs will be transferred to Geneva, and will function by 1971. In its final operational phase this system will utilize a computer. WHO was also asked to disseminate decisions about drugs recognized as ineffective in order to avoid waste of public and private funds.

(b) *Chemical and biological weapons.* A WHO consultant report on chemical and biological weapons, transmitted to the United Nations for the use of the Disarmament Conference, was greeted by the unanimous approval of the Assembly which emphasized the need for rapid prohibition of the development, production, and stockpiling of such weapons, and their destruction, as a necessary measure in the fight for human health.

(c) *Against smoking.* Because of its consequences for health, the use of tobacco was condemned by the Assembly, believing that health agencies must now demonstrate their concern in the matter. The Director General of WHO was asked to bring to FAO's attention the need for studying crop substitution in tobacco-producing countries and to request all those present at WHO meetings to refrain from smoking. A report prepared by two specialists chosen by the Director General recommended, among other measures, that the tar and nicotine contents of cigarettes should appear on packets and in advertisements, accompanied by a warning on the health hazards of cigarette smoking. The Director General was requested to call these and other recommendations to the attention of all Members and Associate Members.

(d) *Yellow fever.* Five countries in West Africa experienced epidemic outbreaks of yellow fever, killing hundreds and possibly thousands of people, during the last months of 1969. There is still a danger that further outbreaks will occur during the rainy season which begins in July, as well as in countries where potential insect vectors are present.



The Government of USA announced that it was prepared to contribute up to \$400,000 to meet an emergency, on a 40% matching basis. Brazil and Columbia will make contributions of vaccine.

(e) *Smallpox eradication.* Since 1967, the first year of the intensified programme of smallpox eradication, incidence has declined almost 60% in the world. In 1969 (through November), 41,068 cases were reported to the Organization and, based on present trends, the final total for that year is expected to be 56,500 cases, the lowest ever notified.

(f) *Drug dependence and youth.* Concern at the extensive and serious public health problems resulting from self-administration of dependence-producing drugs, particularly in young people, was expressed by the Assembly which asked the Director General to study the medical, scientific, and social factors involved in drug dependence. It was emphasized that medical considerations must be at the base of all decisions to control the abuse of dependence-producing drugs and that traditional repressive methods must be supplemented by services for prevention and treatment.

(g) *Renewed efforts against malaria.* The fight against malaria continues with considerable success but there are setbacks in some countries and many questions about malaria must still be answered. Current programmes are being reviewed to apply the new strategy adopted by the last Assembly in 1969: main features are diversification of methods, better adaptation to local conditions, and more realistic planning. The search for better insecticides continues. Over 1,300 compounds have been tested in WHO's evaluation programme. Thus far, few are as safe, none as cheap to produce nor in the long run as effective, as DDT.

(h) *Monitoring of the environment.* At the request of the Assembly, a long-term programme for environmental health comprising measures to combat water, soil, food, and air pollution, will be submitted by the Director General to the next Assembly in 1971, including, as far as practicable, a world-wide system of surveillance and monitoring of pollution, and code of environmental health. The Assembly reaffirmed WHO's leading role in the prevention and control of environmental factors adversely affecting health.

(i) *Health hazards of food additives.* Any decision to limit the use of food additives should be immediately communicated to WHO by Member States. WHO, in turn, was requested by the Assembly to transmit immediately to Member States all information received on food additives and to take steps to evaluate any evidence of toxicity of specific food additives.

(j) *Human rights.* Noting that the Director General transmitted to the United Nations a memorandum on *the protection of the human personality and its physical and intellectual integrity in the light of advances in medicine, chemistry, and biochemistry*, the Assembly requested him to study further the implications of this matter to WHO and to report to the Executive Board.

(k) *Refugees in the Middle East.* Having examined a report on health services and facilities for refugees and displaced persons in the Middle East submitted by the Director General, as well as the report on the Health Services of the United Nations Relief and Works Administration (UNRWA), the Assembly asked the Director General to make a worldwide appeal for material and human aid to the inhabitants of the occupied territories, and, to take all effective measures in his power to safeguard health conditions amongst refugees, displaced persons and the inhabitants of the occupied territories of the Middle East.

(l) *Fourth Report on the World Health Situation.* In the Fourth Report on the World Health Situation, presented to delegates of the Assembly, population changes in the world between 1960 and 1968 were analyzed to uncover their significance for health services, their effect on disease and on the social conditions relating to health. The report would be published in 1970.

(m) *Membership.* Consideration of the application for membership of WHO of the German Democratic Republic was postponed until next year, by the Assembly.

(n) *Technical discussions.* Informal technical discussions were held in the course of the Assembly on *Education for the health professions—regional aspects of a universal problem:* adaptation of education for the health professions, including medicine, to local needs and resources, and a judicious distribution of functions between physicians, and other health professionals.

R. MORF

## TRAINING OF RESEARCH WORKERS IN THE MEDICAL SCIENCES

Geneva, 10-11 September 1970

Since the proceedings of this round-table conference, organized by the Council for International Organizations of Medical Sciences at WHO headquarters, will appear in print, this report will be short only.

In the discussions emphasis was placed on the training of medical staff (physicians as medical research workers). The education of medical research workers with a background in chemistry, physics, or general biology was mentioned and the required cooperation between medical staff and scientists with an education in natural sciences was emphasized. There was no unity of view with regard to the question whether education to medical research workers should start already very early in the medical curriculum, or whether it should start after this curriculum as a postgraduate education. Because of the time required and the fact that the normal medical curriculum does not prepare for a career as a scientific investigator, an early differentiation in the medical curriculum with special courses for the education of medical research workers seems to be required. On the other hand it may be useful to bring to the attention of students in the Faculty of Sciences already at an early stage that there are good opportunities for them as research workers both in life sciences and medical sciences. The new trends in these sciences are clearly chemical and physical in nature. Besides this, also epidemiology and health communication require the special attention of medical research workers in the future.

One should be aware of the fact that the use of the terms *medical sciences* and *research workers in medical sciences* imply that work in this field must be directed towards particular objectives, namely to a contribution to mankind's health. This also holds true for fundamental work in this field. The principle of *l'art pour l'art* or *sciences because of science* does not hold true here. A consequence of the foregoing is that medical research can proceed on the basis of projects with a definite goal which implies that there can be clearcut planning as well from the point of view of materials and personnel as from the point of view of priorities to be given to certain types of investigation or certain objects to be investigated.

In the past most medical research workers could be considered as autodidacts as far as they originated from the medical profession. In part of the cases there has been a kind of apprenticeship, a period of cooperation with a more advanced research worker, a practical training. The question arises whether organized scheduled formal training is required for the future. The problem can be formulated as follows: what is the objective of training medical research workers, what will be their task? Who will be recruited as medical research workers for the future? How will the medical research worker be trained or have to be trained and where must that training take place? A suitable balance between formal and practical training is advocated. An international exchange program offering opportunities to young research workers to study for periods of one or two years at centres of excellence may be promising. Emphasis should be placed on the multidisciplinary nature of medical research work which implies that teamwork is required while the teams involved should comprise workers from various disciplines.

The use of the term research-physician is suggested with a specialization in four categories, viz. a function orientated, a biochemically orientated, a morphologically orientated, and a social-sciences orientated category. Much of the research here marked today as medical research or basic medical research strictly taken has nothing to do with medicine; it is research in life sciences with no specific outlook to health-care and therefore does not deserve the title *medical research*.

E. J. ARIENS



## **FORTHCOMING IUPAC-SPONSORED EVENTS**

### **INTERNATIONAL SYMPOSIUM ON IDENTIFICATION AND MEASUREMENT OF ENVIRONMENTAL POLLUTANTS**

**Ottawa, 14-17 June 1971**

The Association of Official Analytical Chemists is the prime sponsor of the Symposium and the cosponsors are IUPAC, the Chemical Institute of Canada, the Agricultural Institute of Canada and the National Research Council of Canada.

Sessions will be conducted at the National Arts Centre beginning on Monday, 14 June, and will conclude on Thursday, 17 June. Time is being allowed in the programme for technical tours for those who wish to participate and there will be an exhibit of scientific equipment related to pollution studies and control.

#### **Programme**

The programme will consist solely of specially invited papers by prominent speakers from around the world, both to assess the *State of the Art* and to present the latest techniques for identifying and measuring air, water and land pollutants and such related topics as noise pollution, heating effects, economics of pollution abatement, biological indicators, *etc.* It is our hope to stimulate discussions of these most important aspects by specialists and thus promote technical and scientific cooperation. It is anticipated that approximately eighty papers will be presented.

#### **Languages**

The official languages for the technical sessions will be English and French. Simultaneous interpretation will be available during all technical sessions in these two languages.

#### **Publication of Proceedings**

All papers and written discussion will be published in the proceedings of the Symposium.

#### **Correspondence**

All correspondence relating to the Symposium should be addressed to:

Mr. M. K. WARD, Executive Secretary  
International Symposium on Identification and  
Measurement of Environmental Pollutants  
c/o National Research Council of Canada  
Ottawa 7, Ontario, Canada  
Telephone (613) 993-1421

## INTERNATIONAL MEETING ON BORON COMPOUNDS

Castle Liblice near Prague, 21-25 June 1971

### Topics

*Boron hydrides, Organoboron Compounds, Carboranes, Metallo Boron Compounds, Theory, Syntheses, Properties and Applications*

### Main Lectures

W. N. LIPSCOMB (Harvard University, Cambridge, Mass., USA): *Boranes—Structures and Theory*

L. I. ZACHARKIN (Academy of Sciences, Moscow, USSR): *Carboranes*

H. C. BROWN (Purdue University, Lafayette, Indiana, USA): *Hydroboration and Organoboranes*

F. M. HAWTHORNE (University of California, Los Angeles, California, USA): *Sandwich-like Metallo Boron Complexes*

R. F. WILLIAMS (Space-General Corp., El Monte, California, USA): *Practical Uses of Boron Compounds*

E. L. MUETTERTIES (E.I. Du Pont de Nemours & Co., Inc., Wilmington, Delaware, USA): *Polyhedral Boranes*

The individual daily programme will be introduced by main lectures, the presentation of which is anticipated to take about 60 minutes. The full texts of short communications will be published in the Proceedings of International Meeting on Boron Compounds, which will be edited during two years after the termination of the symposium. Main lectures in full will appear in the IUPAC journal, *Pure and Applied Chemistry*. Short communications are expected to take up to 20 minutes. Discussions will not be limited to the topics of the main lectures or short communications: both general and special problems involved in the given thematic field will be discussed.

### Imeboron Symposium Secretariat

All correspondence should be kindly directed to:

Institute of Inorganic Syntheses  
Czechoslovak Academy of Sciences  
Rež near Prague, Czechoslovakia  
Phone: 896 290, Prague  
Telex: UJV Rez 012326

## II INTERNATIONAL CONFERENCE ON CALORIMETRY AND THERMODYNAMICS

Orono, Maine, 12-14 July 1971

The Conference is sponsored by The Calorimetry Conference (USA) and the Commission on Thermodynamics and Thermochemistry of IUPAC. The Conference will also be the 26th Annual Meeting of The Calorimetry Conference (USA). The program will consist of contributed papers by participants and a small number of invited lectures.

## Topics

The scope of the Conference will coincide with that of the 1st International Conference at Warsaw, 1969, as listed below:

1. Calorimetric techniques and apparatus.
2. Thermochemical quantities, including enthalpies of combustion, of chemical reaction, of solution and mixing, determined by direct calorimetry or by chemical equilibrium studies.
3. Thermal properties (heat capacities, heats of transition, *etc.*) for non-reacting systems determined by calorimetric methods.
4. Vaporization studies, *e.g.*, vapor pressures, decomposition pressures, adsorption of gases, effusion measurements.
5. Non-calorimetric studies of thermodynamic properties in single and multicomponent systems (PVT data, compressibility, phase studies, solubilities).
6. Thermodynamics of systems of biochemical interest.
7. Thermodynamics of liquids (mixed liquids, ionic solutions, polyelectrolytes, *etc.*).

## Conference Languages

Since no arrangement will be made for simultaneous translation, the speakers are kindly requested to use a language that is widely understood by the participants, preferably English.

## Publications

In keeping with USA Calorimetry Conference tradition, the only publication will be a terse abstract of each talk and a brief summary of the meeting in *Science*. A collection of the abstracts will be available at the meeting. Authors are free to publish their full papers in a journal of their choice. The number of papers to be presented at the Conference may be limited and the sponsoring organization reserves the right to select these from papers submitted.

## Application

The Conference program will be organized by the Chairman-elect of the USA Calorimetry Conference, to whom prospective participants should write:

Dr. S. GUNN  
University of California Radiation Laboratory,  
Livermore, California 94550,  
USA

## VIII IUPAC MICROSYMPOSIUM ON MACROMOLECULES: POLYMER MORPHOLOGY

**Prague, 30 August-2 September 1971**

The meeting will deal mainly with the following topics:

1. Formation of supermolecular structures in solutions, melts, and polymerizing systems.



2. Morphology of single crystals, spherulites and oriented crystallized polymers.
3. Morphology of amorphous homopolymers, copolymers and polymeric mixtures.
4. Morphological changes caused by physical and chemical treatment.
5. Effect of morphology on physical properties of polymers.

The individual sessions will be introduced by main lectures. Up to now seven outstanding scientists have promised or have been asked to present the main lectures:

- E. H. ANDREWS: Influence of morphology on mechanical properties of crystalline polymers  
 E. W. FISCHER: Effect of annealing and temperature on the morphological structure of polymers  
 B. WUNDERLICH: Extended chain crystals of linear high polymers.  
 N. F. BAKEEV: (title not given)  
 A. KELLER: (title not given)  
 A. NAKAJIMA: (title not given)  
 G. S. Y. YEH: (title not given)

## **IX IUPAC MICROSYMPOSIUM ON MACROMOLECULES: THERMODYNAMICS OF INTERACTIONS IN POLYMER SOLUTIONS**

**Prague, 6-9 September 1971**

The meeting will deal mainly with the following phenomena and the way they are reflected in the thermodynamic behaviour of macromolecular systems:

1. Interactions arising from the difference in size and shape of the polymer and solvent molecules.
2. Solvation of the macromolecule by specific interactions.
3. Hydrophobic bonds and clustering in the system polymer—low-molecular weight compounds.
4. Interactions in dilute polymer solutions.

The individual sessions will be introduced by main lectures. Up to now eight outstanding scientists have promised or have been asked to present the main lectures:

- P. J. FLORY: Opening Lecture  
 E. F. CASASSA: Thermodynamic Interactions in Dilute Polymer Solutions: A Survey of Current Ideas  
 M. L. HUGGINS: Thermodynamic Properties of Polymer Solutions: Dependence on Molecular Properties  
 J. L. LUNDBERG: Molecular Clustering and Segregation in Systems of Polymers and Low-Molecular Weight Compounds  
 J. NÉEL: Experimental Study (IR and NMR) of the Influence of Specific Intramolecular Interactions on the Conformation of Model Molecules (with Special Reference to Peptides and Oligopeptides)

- D. PATTERSON: Role of Free Volume in Polymer Solution Thermodynamics  
O. B. PTITSYN: Thermodynamic Parameters of Helix-Coil Transitions in Polypeptide Chains  
H. YAMAKAWA: (title not given)

### **Participation in Microsymposia**

A limited number of short communications, preferably those dealing with one of the topics mentioned above, will be accepted for presentation at the meeting. The main subjects will also be dealt with in panel discussions. All of the main lectures are to be published eventually in *Pure and Applied Chemistry*.

Those intending to participate in the Microsymposia (or those interested in obtaining further information) should write to the PMM Secretariat, c/o Institute of Macromolecular Chemistry, 1888 Petřiny, Prague 6, Czechoslovakia, as soon as possible.

## **V INTERNATIONAL CONGRESS ON CATALYSIS**

**Miami, Florida, 21-25 August 1972**

### **Scientific Program**

The theme of the Congress is *The Science of Catalysis*. There will be a few invited plenary lectures but the major portion of the program will consist of contributed papers. The Committee encourages the submission of papers which make fundamental contributions to our understanding of heterogeneous catalysis. It also welcomes submission of papers dealing with homogeneous catalysis and, particularly, papers which propose correlations between homogeneous and heterogeneous catalysis. Acid-base catalysis in homogeneous systems is not within the scope of the Congress.

The Committee hopes that it will be able to accept all qualified papers which fall within the scope of the Congress but, in the event that more papers are submitted than can be accommodated in the program, those papers will be selected which in the judgment of the Committee make the greatest contribution to the theme of the Congress.

The Committee expects that it will be necessary to arrange a program with dual sessions but it hopes to avoid more than two simultaneous sessions.

### **Congress Languages**

The official language of the Congress will be English. Since arrangements for simultaneous translation will not be made, the Committee strongly recommends that each speaker uses a language which will be understood by a majority of the participants. Papers and abstracts should be in English. If papers and abstracts cannot be in English, the Congress Committee will arrange for translations from French, German or Russian, without assuming responsibility for accuracy of translation.

Interpreters will be available at the Congress to assist participants and speakers.

## **Presentation and Discussion of Papers**

It is planned to provide sufficient time for adequate discussion of the contributed papers and the participants are urged to take part in this important function of the Congress. The discussion will be as informal as possible. The presentation of the papers will necessarily be limited to an abbreviated form. All papers will be preprinted and the entire proceedings of the Congress will be published and distributed to the members of the Congress.

## **Participation**

Those interested in participating in the Congress should write to:

V International Congress on Catalysis  
VLADIMIR HAENSEL, Chairman of Organizing Committee  
c/o Universal Oil Products Co.  
30 Algonquin Road  
Des Plaines, Illinois 60016, USA



## INTERDISCIPLINARY MATTERS

On the recommendation of the President of IUPAC, Dr. REES, the following *ad-hoc* Committee on Interdisciplinary Matters was appointed by the Bureau during the XXVth IUPAC Conference (Cortina d'Ampezzo, 1969): Prof. J. BÉNARD, Chairman and Convenor (France), Prof. O. WICHTERLE (Czechoslovakia), Dr. D. C. (now Sir DAVID) MARTIN (UK). Following a wide exchange of views on the whole range of problems arising from the current rapid development of several areas of science of an interdisciplinary or multidisciplinary nature, the Committee made a number of recommendations. These were accepted in full by the Bureau at its meeting in Vienna on 2-3rd October 1970.

### I. Cooperation with Existing Associated Organizations

It is recommended that there be closer cooperation between existing Associated Organizations and IUPAC by:

- (a) Inviting Delegates from Associated Organizations to the biennial IUPAC Conferences and to attend relevant Division Committees and Commission meetings, when joint sponsorship of meetings or other joint activities may be discussed.
- (b) To offer assistance in publicizing Conferences of Associated Organizations.
- (c) To present, when relevant, IUPAC publications and eventually minutes of relevant Division Committees and Commission meetings to Associated Organizations.

A brief statute for Associated Organizations should be elaborated along these lines as soon as possible.

### II. Cooperation with Other Bodies

As first steps to establishing closer cooperation with other Bodies, it is recommended that information should be collected by:

- (a) Inviting the Officers of Division Committees, Commissions, *etc.*, and the National Adhering Organizations of IUPAC to consider potential points of contact with other existing Bodies, with the intention of promoting closer cooperation with IUPAC.
- (b) The IUPAC Secretariat inviting other Unions and other ICSU Bodies to consider how closer cooperation can be promoted with IUPAC. Special attention should be paid to methodical approach of problems which are simultaneously represented in IUPAC and in other Unions (teaching, documentation, common standards, . . .).

Thereafter the information should be reviewed in consultation with the Divisions concerned, so that the mode of cooperation can be recommended.

Different ways can be envisaged, some of which have already been put into practice by IUPAC in different fields. This plurality of means adapted for necessary very different situations should be safeguarded.

### **III. Policy Concerning Investigation in Developing Fields**

Even more important than the repair of existing non-cooperation, IUPAC should exercise more initiative in encouraging and promoting new developments in all aspects of chemistry and closely related subjects, making maximum use of existing IUPAC bodies to achieve this, thereby preventing the creation of international chemical organizations outside IUPAC. The Officers of the Division Committees and Commissions should be invited to pay special attention to this exploratory work.

### **IV. Publications**

One of the best ways of promoting interdisciplinary cooperation is to encourage scientific meetings cosponsored with other Scientific Unions. To facilitate the organization of such meetings, it is recommended that the policy for publication by IUPAC should become more flexible.

**J. BÉNARD**

## CALENDAR OF IUPAC-SPONSORED MEETINGS

1971

February 17-19	International Symposium on Pesticide Terminal Residues (Organizing Committee, IInd International Congress of Pesticide Chemistry, POB 16271, Tel Aviv, Israel)	Tel Aviv (Israel)
February 21-27	IInd International Congress of Pesticide Chemistry (Organizing Committee, IInd International Congress of Pesticide Chemistry, POB 16271, Tel Aviv, Israel)	Tel Aviv (Israel)
March 1-3	Symposium on Antibiotics (Dr. S. RAKHIT, Chairman of Organizing Committee, Symposium on Antibiotics, c/o Ayerst Research Laboratories, POB 6115, Montreal, Quebec, Canada)	St. Marguerite Quebec (Canada)
June 14-17	International Symposium on Identification and Measurement of Environmental Pollutants (Mr. M. K. WARD, Executive Secretary, International Symposium on Identification and Measurement of Environmental Pollutants, c/o National Research Council of Canada, Ottawa 7, Ontario, Canada)	Ottawa (Canada)
June 21-25	International Meeting on Boron Compounds (J. PLESEK, Institute of Inorganic Syntheses, Czechoslovak Academy of Sciences, Rez near Praha, Czechoslovakia)	Liblice (Czechoslovakia)
June 22-24	Conference on Chemical Transformations of Polymers (Dr. M. LAZAR, Polymer Institute, Slovak Academy of Sciences, Dubravská Cesta, Bratislava, Czechoslovakia)	Bratislava (Czechoslovakia)
July 5-9	IIIRD International Congress on Crystal Growth (Secretariat ICCG-3, Laboratoire des Mécanismes de la Croissance cristalline, Faculté des Sciences de Marseille, St-Jérôme, F-13 Marseille 13 <sup>e</sup> , France)	Marseille (France)
July 12-14	IInd International Calorimetry Conference (Dr. S. GUNN, University of California Radiation Laboratory, Livermore, California 94550, USA)	Orono, Maine (USA)
July 12-16	IIIRD Society for Analytical Chemistry Conference (Mr. F. C. SHENTON, County Analyst's Department, County Hall, Durham, UK)	Durham (UK)
July 15-24	XXVIth International Conference of Pure and Applied Chemistry (Executive Secretary, IUPAC Secretariat, Bank Court Chambers, 2/3 Pound Way, Cowley Centre, Oxford OX4 3YF, UK)	Washington, DC (USA)
July 25-30	XXIIIRD International Congress of Pure and Applied Chemistry (Mr. A. T. WINSTEAD, American Chemical Society, 1155 Sixteenth Street NW, Washington, DC 20036, USA)	Boston (USA)
August 16-21	Vth International Conference on Organometallic Chemistry (Organizing Committee, Vth International Conference on Organometallic Chemistry, Institute of Organo-Element Compounds, Academy of Sciences of USSR, Ul. Vavilova 28, Moscow B-312, USSR)	Moscow (USSR)
August 23-31	IVth International Symposium on Magnetic Resonance (Dr. D. FIAT, Chairman of Organizing Committee, IVth International Symposium on Magnetic Resonance, c/o Weizmann Institute of Science, Rehovot, Israel)	Rehovot Jerusalem (Israel)



August 30– September 2	VIIIth Prague IUPAC Microsymposium on Macromolecules: Polymer Morphology (Microsymposium Secretariat, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Petřiny 1888, Praha 6, Czechoslovakia)	Prague (Czechoslovakia)
August 30– September 3	International Symposium on Chemical Education (Prof. E. GIESBRECHT, Instituto de Química, Universidade de São Paulo, Caixa Postal 8105, São Paulo, Brazil)	São Paulo (Brazil)
September 6–9	IXth Prague IUPAC Microsymposium on Macromolecules: Thermodynamics of Interactions in Polymer Solutions (Microsymposium Secretariat, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Petřiny 1888, Praha 6, Czechoslovakia)	Prague (Czechoslovakia)
September 6–10	Symposium on Advances in Microbial Engineering (Dr. Z. STERBACEK, Secretary of Organizing Committee, Symposium on Advances in Microbial Engineering, c/o Institute of Microbiology, Czechoslovak Academy of Sciences, Budejovická 270, Praha 4-Křc, Czechoslovakia)	Marienbad (Czechoslovakia)
1972		
February	VIIIth International Symposium on Chemistry of Natural Products (Prof. S. RANGASWAMI, Indian National Science Academy, Bahadur Shah Zafar Marg, New Delhi-1, India)	New Delhi (India)
April 3–7	International Congress on Analytical Chemistry (Organizing Committee, International Congress on Analytical Chemistry, Kyoto International Conference Hall, Takaraike, Sakyo-ku, Kyoto, Japan)	Kyoto (Japan)
June 4–7	IIIrd International Symposium on Carotenoids other than Vitamin A (Prof. C. BODEA, Chairman of Organizing Committee, IIIrd International Symposium on Carotenoids, Ministerul Invajamintului, Institutul Agronomic "Dr Petru Groza", Strada Manastur 3, Cluj, Romania)	Cluj (Romania)
June 5–8	IUPAC-EUCEPA Symposium on Man-made Polymers in Papermaking (Mr. L. NEIMO, Executive Secretary, IUPAC-EUCEPA Symposium on Man-made Polymers in Papermaking, c/o Finnish Pulp and Paper Research Institute, POB 10136, Helsinki, Finland)	Helsinki (Finland)
June 10–15	Microsymposium on Photochemical Processes in Polymer Chemistry (Prof. G. SMETS, Laboratoire de Chimie macromoléculaire, Université de Louvain, Celestijnenlaan 200 F, B-3030 Heverlee, Belgium)	Louvain (Belgium)
August 21–25	Vth International Congress on Catalysis (Dr. V. HAENSEL, Chairman of Organizing Committee, Vth International Congress on Catalysis, c/o Universal Oil Products Co., Algonquin Road, Des Plaines, Illinois, USA)	Miami Beach Florida (USA)
1973		
August 23– September 2	XXVIth International Conference on Pure and Applied Chemistry (Executive Secretary, IUPAC Secretariat, 2/3 Pound Way, Cowley Centre, Oxford OX4 3YF, UK)	Hamburg (Germany)
September 3–7	XXIVth International Congress on Pure and Applied Chemistry (Dr. W. FRITSCH, Gesellschaft Deutscher Chemiker, Carl-Bosch-Haus, Varrentrappstrasse 40–42, Postfach 9075, D-6000 Frankfurt/Main W 13, Germany)	Hamburg (Germany)

## NON-IUPAC MEETINGS

1971

March 30– April 2	EUCHEM Conference on Organic Chemistry of Phosphorus and of the Heavier Elements of Group Va (GDCh-Geschäftsstelle, Postfach 119075, D-6000 Frankfurt/Main, Germany)	Schloss Elmau Mittenwald (Germany)
May 31– June 4	Symposium on Biological Aspects of Electrochemistry (Prof. G. MILAZZO, Istituto superiore di Sanita, Viale Regina Elena 299, I-00161 Rome, Italy)	Rome (Italy)
July 6–9	IVth European Symposium: Food—Progress in Food Process Engineering with Special Consideration of Proteins, Enzymes, and Aromas (GDCh-Geschäftsstelle, Postfach 119075, D-6000 Frankfurt/Main, Germany)	Prague (Czechoslovakia)
August 16–19	VIIIth Australian Spectroscopy Conference (Dr. J. E. KENT, Department of Chemistry, Monash University, Clayton, Victoria, Australia 3168)	Clayton Victoria (Australia)
August 31– September 3	Xth International Symposium on Free Radicals (Dr. M. PEYRON, Institut national des Sciences appliquees, 20 avenue Albert Einstein, F-69 Villeurbanne, France)	Lyon Villeurbanne (France)
September 27– October 1	EUCHEM Conference on Kinetics of Chemical Elementary Reactions (GDCh-Geschäftsstelle, Postfach 119075, D-6000 Frankfurt/Main, Germany)	Göttingen (Germany)
October 4–9	XVI Colloquium Spectroscopicum Internationale (GDCh-Geschäftsstelle, Postfach 119075, D-6000 Frankfurt/Main, Germany)	Heidelberg (Germany)

## APPENDICES TO INFORMATION BULLETIN

The following Appendices on Tentative Nomenclature, Symbols, Units, and Standards are in process of being issued:

- No. 9—Abbreviations and Symbols for Nucleic Acids, Polynucleotides and Their Constituents
- No. 10—Abbreviations and Symbols for Description of Conformation of Polypeptide Chains
- No. 11—Recommendations for Presentation of Raman Spectra for Cataloging and Documentation in Permanent Data Collections
- No. 12—List of Abbreviations for Synthetic Polymers and Polymer Materials
- No. 13—Basic Definitions of Terms Relating to Polymers

The first publication in the new series of Technical Reports will also be available shortly:

- No. 1—Collaborative Study of a Method for Determination of Concentration and Purity of Aflatoxin Standards and Use of the Method for Measuring Stability of the Standards

Gratis copies may be obtained by writing to the IUPAC Secretariat, Bank Court Chambers, 2-3 Pound Way, Cowley Centre, Oxford OX4 3YF, UK.

## INTERNATIONAL LIST OF PERIODICAL TITLE WORD ABBREVIATIONS

The availability of an *International List of Periodical Title Word Abbreviations* sponsored by UNESCO and ICSU and prepared within the framework of the UNISIST Study for the UNISIST/ICSU Abstracting Board Working Group on Bibliographic Descriptions, is announced.

The *International List* contains over 7000 words or word roots with their recommended abbreviations. Dated 1970 it is based on the Word-Abbreviations Lists published since 1966 by the National Clearinghouse for Periodical Title Word Abbreviations of the American National Standards Institute, Standards Committee Z39.

Copies of the *International List* may be purchased from:

ICSU AB Secretariat  
17 rue Mirabeau  
F-75 Paris 16<sup>e</sup>, France

The price per copy is US \$ 4.50 plus mailing charges.

Residents of countries in North and South America may purchase copies from one of the ICSU AB Member Services in USA, namely:

Chemical Abstracts Service  
Marketing Department  
University Post Office  
Columbus, Ohio 43210, USA

Prepayment is required for all orders.



## LIST OF ABBREVIATIONS

ACS	American Chemical Society
AOAC	Association of Official Analytical Chemists
CAS	Chemical Abstracts Service
CBN	IUPAC-IUB Commission on Biochemical Nomenclature
CCPR	Codex Alimentarius Committee on Pesticide Residues
CEBJ	IUB Commission of Editors of Biochemical Journals
CEE	Communauté Européenne Economique
CID	Comité International de la Detérgence
CIPM	Comité International de Poids et Mesures
CMN	IUPAC Commission on Macromolecular Nomenclature
CNOC	IUPAC Commission on Nomenclature of Organic Chemistry
CODATA	ICSU Committee on Data for Science and Technology
COMECON	Council for Mutual Economic Assistance
CQUCC	IUPAC Commission on Quantities and Units in Clinical Chemistry
FAO	UN Food and Agriculture Organization
FID	Fédération Internationale de Documentation
IAEA	International Atomic Energy Agency
IAOH	International Association on Occupational Health
ICSU	International Council of Scientific Unions
IFCC	International Federation of Clinical Chemistry
ILO	International Labour Organization
ISO	International Organization for Standardization
IUB	International Union of Biochemistry
IUCr	International Union of Crystallography
IUFST	International Union of Food Science and Technology
IUPAB	International Union of Pure and Applied Biophysics
IUPAP	International Union of Pure and Applied Physics
NBS	US National Bureau of Standards
NPL	UK National Physical Laboratory
OECD	Organization for Economic Cooperation and Development
OIML	Organization Internationale de Métrologie Légale
OSTI	UK Office of Scientific and Technical Information
PAG	Protein Advisory Group of FAO/WHO/UNICEF
SCI	UK Society of Chemical Industry
SCOPE	ICSU Scientific Committee on Problems of the Environment
SI	Système International d'Unités
UN	United Nations
UNESCO	UN Educational, Scientific and Cultural Organization
UNICEF	UN Children's Fund
UNISIST	ICSU-UNESCO Joint Project to study the Feasibility of a World Information System
WHO	UN World Health Organization

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**INTERNATIONAL UNION OF PURE  
AND APPLIED CHEMISTRY**

**UNION INTERNATIONALE DE CHIMIE  
PURE ET APPLIQUÉE**

**INFORMATION BULLETIN  
NUMBER 40**

**JUNE 1971**

**IUPAC SECRETARIAT**

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International Union of Pure and Applied Chemistry  
1971



# INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

President — Dr. A. L. G. REES (Australia)

Vice-President — Prof. J. BENARD (France)

Secretary General — Dr. R. MORF (Switzerland)

Treasurer — Prof. J. C. BAILAR, JR. (USA)

## IUPAC INFORMATION BULLETIN

The Bulletin, issued three times per annum, provides a news medium for the various activities of IUPAC, especially of chemical topics which need regulation, standardization or codification. It includes details of forthcoming international symposia which are to be sponsored by IUPAC together with reports of such meetings which have recently taken place.

The Bulletin is available at an annual subscription of \$2.5 (£1) from the IUPAC Secretariat. Subscribers will also receive the two series of Appendices to the Bulletin: Tentative Nomenclature, Symbols, Units, and Standards; and Technical Reports.

### Editor

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# **XXVIth IUPAC CONFERENCE**

## **WASHINGTON, DC, 15-24 JULY 1971**

### **Accommodation and Travel**

Except for those persons who are making their own arrangements, all reservations for travel and/or accommodation placed through the IUPAC travel agency, Oxonian Travel Services Ltd., have been confirmed in writing to participants. Any queries should be addressed to the IUPAC Secretariat. Coaches will be available to transport participants from Washington airport to the Mayflower Hotel. There will be an IUPAC information desk at the airport and a registration desk at the Hotel.

### **Visas**

Under US law a visa is necessary in order to travel to USA. The US State Department has been informed of the international nature of the Conference and those Conference participants who have not yet applied for a visa should do so immediately to the US Embassy in their respective countries. An official letter supporting a visa application may be obtained from the IUPAC Secretariat.

Participants are reminded that any person entering USA must have been vaccinated against smallpox within three years of his entry as evidenced by a valid International Certificate of Vaccination.

### **Schedule of Meetings**

Only a few changes have been necessary to the Schedule of Meetings published in *Information Bulletin* No. 39 (February 1971). Meetings will be held either in the Mayflower Hotel, Connecticut Avenue, or in the American Chemical Society Offices (5 minutes walk). Details of meeting rooms will be available on arrival at the Hotel.

### **Secretariat**

Throughout the Conference the IUPAC Secretariat will be located in the Pan-American and Cabinet Rooms of the Mayflower Hotel (far end of main lobby):

Telephone—202 DI 7-3000      Telegrams—Mayflower Washington

The Secretariat will be open daily from 0800 hours and provide typing, photocopying, and other services to assist Conference participants in their work. In addition, representatives of the IUPAC travel agency will be present to advise on travel and with suggestions for excursions.

### **Reimbursement**

For those Members of IUPAC bodies eligible for travel and subsistence expenses and who have requested reimbursement in Washington, this will be made at

Riggs National Bank of Washington  
1503 Pennsylvania Avenue NW  
Washington, DC 20013

This Bank is located near to the Mayflower Hotel.

## Social Programme

<i>15 July</i> 18.30	Address on the international scientific activities of the National Science Foundation by Dr. THOMAS B. OWEN (Assistant Director for National and International Programmes, US National Science Foundation)	Auditorium of National Academy of Sciences
19.30	Reception for all Conference participants and their wives	Diplomatic Meeting Room of the State Department
<i>19 July</i>		
Morning and afternoon	The US National Bureau of Standards will welcome those participants who wish to visit the Bureau	Located about 45 minutes outside Washington; transportation arranged The Mayflower Hotel
18.30	Reception and banquet for all Conference participants and their wives, with an address by Dr. HARRISON BROWN (Foreign Secretary, US National Academy of Sciences)	
<i>21 July</i>		
19.00– 21.30	Reception for Council Delegates and their wives	Great Hall of National Academy of Sciences

## Ladies' Programme

On 15, 16, 17, and 19 July, several tours in the Washington area are planned for the ladies (tour of Washington, tour of Capitol and neighbouring area, tour of White House, tour of art museums, tour of religious centres).

## Weather and Clothing

Formal dress will not be essential for any of the social functions. The average summer temperature for Washington, DC, is 25°C, but it is likely to be higher during the month of July.



# SCHEDULE OF MEETINGS FOR XXVth IUPAC CONFERENCE

Meeting of	Thursday 15 July	Friday 16 July	Saturday 17 July	Sunday 18 July	Monday 19 July	Tuesday 20 July	Wednesday 21 July	Thursday 22 July	Friday 23 July	Saturday 24 July
<b>Council</b>							10-12 14-18		10-12 14-18	
<b>Bureau</b>						9-12 14-18				9-12 14-16 16-18
<b>Executive Committee</b>					9-12 14-18					
<b>Finance Committee</b>				9-12 14-18						
<b>Division Presidents</b>								9-12 14-18		
<b>Committee on Publications</b>	9-12 14-18									
<b>Inter-Divisional Committee on Machine Documentation</b>		9-12				9-12 14-18				
<b>Inter-Divisional Committee on Nomenclature and Symbols</b>					9-12			16-19		
<b>Coordinating Committee for Analytical Methods</b>			19-21			19-21				
<b>Committee on Congress Organization and Programmes</b>			14-18			19-21 9-12 14-18		9-12 14-18	9-12 14-18	
<b>Committee on Teaching of Chemistry</b>					9-12 14-18					
<b>Ad-hoc Committee on Statutes and By-laws</b>								9-12		
<b>Clinical Chemistry Section</b>										
<b>Section Committee</b>										
<b>Commission on Automation</b>	9-12* 14-17	9-12 14-18	9-12* 14-18 9-12 14-18		9-12 14-18					
<b>Commission on Teaching</b>	9-12 14-17									
<b>Commission on Quantities and Units</b>				9-12 14-18		9-12 14-18				
<b>Joint Meeting of Commis- sion V.3 and Commis- sion on Automation</b>	9-12	9-12								

Meeting of	Thursday 15 July	Friday 16 July	Saturday 17 July	Sunday 18 July	Monday 19 July	Tuesday 20 July	Wednesday 21 July	Thursday 22 July	Friday 23 July	Saturday 24 July
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## Physical Chemistry Division

### Division Committee

Commission I.1; Physicochemical Symbols, Terminology and Units	9-12 13-17*	9-12 14-18*	9-12* 14-18	9-12* 14-18	14-18 9-12	9-12 14-18				
Commission I.2; Thermodynamics and Thermochemistry	13-17*	14-16 18-20*	9-12 14-18	9-12* 14-18		9-12* 14-18				
Commission I.3; Electrochemistry	9-12 13-17*	9-12* 14-18	9-12* 14-18	9-12* 14-18		9-12* 14-18				
Commission I.4; Physicochemical Measure- ments and Standards	9-12 14-16	14-18 14-16	9-12 14-18	9-12* 14-18	9-12					
Commission I.5; Molecular Structure and Spectroscopy		14-18*	9-12 14-18	9-12* 14-18	9-12 14-18					
Commission I.6; Colloid and Surface Chemistry	9-12 14-17	9-12* 14-18	9-12 14-18	9-12* 14-18						
Joint Meeting of Com- missions I.2 and I.4 I.2 and I.2.1		18-20*				9-12				
Joint Meeting of Com- missions I.3 and V.5	13-17					9-12				
Joint Meeting of Com- missions I.1 and I.5		14-18								
Joint Meeting of Com- missions I.1 and I.2	13-17									
Joint Meeting of Com- missions I.1 and I.3			9-12							
Joint Meeting of Com- missions I.1 and I.6										
Joint Meeting of Com- missions I.3 and I.6		9-12								

Meeting of	Thursday 15 July	Friday 16 July	Saturday 17 July	Sunday 18 July	Monday 19 July	Tuesday 20 July	Wednesday 21 July	Thursday 22 July	Friday 23 July	Saturday 24 July
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## Inorganic Chemistry Division

Division Committee	9-12				14-18					
Commission II.1: Atomic Weights	14-18		14-18	9-12 14-18						
Commission II.2: Nomenclature of Inorganic Chemistry	9-12 14-18		9-12 14-18	9-12 16-18		9-12				
Commission II.3: High Temperatures and Refractories	14-18		9-12 14-18							

## Organic Chemistry Division

Division Committee	9-12 14-18				14-18					
Commission III.1: Nomenclature of Organic Chemistry	9-12 14-18		9-12 14-18	9-12 14-18		9-12 14-18				
Commission III.2: Chemical Plant Taxonomy Section III.4:			9-12 14-18	9-12 14-18						
Medicinal Chemistry Open Meeting of Organic Chemistry Division	14-18		14-18	14-18	14-18 9-12					

## Macromolecular Division

Division Committee	9-12 14-17		9-12*							
Commission IV.1: Macromolecular Nomen- clature Joint Meeting of Division IV Committee, Section VI.6 and Section VI.7				9-12 14-18	14-18	9-12 14-18	14-18			



Meeting of	Thursday 15 July	Friday 16 July	Saturday 17 July	Sunday 18 July	Monday 19 July	Tuesday 20 July	Wednesday 21 July	Thursday 22 July	Friday 23 July	Saturday 24 July
<b>Analytical Chemistry Division</b>										
Division Committee		9-12 14-18			14-17					
Commission V.1: Analytical Reactions and Reagents	9-12 13-17		9-12 14-18*	9-12 13-20*						
Commission V.2: Microchemical Techniques and Trace Substances			9-12 14-18	9-12 14-18						
Commission V.3: Analytical Nomenclature	9-12*	9-12 14-18	9-12* 14-18*	9-12 14-18						
Commission V.4: Spectrochemical and Other Optical Procedures for Analyses	9-12	14-17	9-12 14-18	9-12 14-18						
Commission V.5: Electroanalytical Chemistry	9-12	9-12 14-18	9-12 14-18	9-12* 14-18						
Commission V.6: Equilibrium Data	9-12 13-17		14-18*							
Commission V.7: Analytical Radiochemistry and Nuclear Materials		9-12	9-12	14-18	14-18					
Joint Meeting of Com- mission V.1 and Section VI.1			14-18	18-20						
Joint Meeting of Secretaries	13-17									
Joint Meeting of Com- mission I.3 and Commission V.5 (Chairman and Secs.)	13-17			9-12						
Joint Meeting of Com- mission V.3 and Commission on Automation of Clinical Chemistry Section	9-12		9-12							
Joint Meeting of Com- mission V.3 and Commission V.6			14-18							
Open Meeting of Analytical Chemistry Division					9-12					

Meeting of	Thursday 15 July	Friday 16 July	Saturday 17 July	Sunday 18 July	Monday 19 July	Tuesday 20 July	Wednesday 21 July	Thursday 22 July	Friday 23 July	Saturday 24 July
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## Applied Chemistry Division

Division Committee	9-12				9-12					
Section VI.1:		10-11	10-12	14-16						
Food			14-18*	18-20*						
Sub-Commission VI.1.1.1:		11-12.30	9-10	9-12						
Mycotoxins		14-18								
Sub-Commission VI.1.1.2:		11-12.30	9-10	9-12						
Smoke Constituents		14-18								
Commission VI.1.2:		11-12.30	9-10	9-12						
Food Additives and Con-	13-15*									
taminants	15-17*	14-18								
Section VI.2:	13-15		9-12	9-12						
Fermentation Industries	15-17*		14-18	14-18						
Section VI.4:			9-12	9-12						
Toxicology and Industrial	13-17	14-18		17-20						
Hygiene										
Section VI.5:	13-15*	9-12				14-18				
Pesticides	15-17									
Commission VI.5.1:			9-12							
Terminal Pesticide Residues		13-17	13-17							
Commission VI.5.2:				9-12	9-12	9-12				
Pesticide Residue Analysis				14-18						
Section VI.6:										
Organic Coatings		9-12	9-12*							
Section VI.7:		14-18	14-18							
Pulp, Paper, and Board		9-12	9-12*							
Section VI.8:	13-17	14-18								
Water, Sewage, and		9-12		9-12						
Industrial Wastes		14-18		14-18						
Open Meeting of Applied					14-17					
Chemistry Division										
Joint Meeting of Division IV			9-12							
Committee, Section VI.6 and										
Section VI.7										
Joint Meeting of Section			14-18							
VI.1 and Commission V.1					18-20					
Joint Meeting of Section	13-15									
VI.5 and Commission VI.1.2										
Joint Meeting of Section	15-17									
VI.2 and Commission										
VI.1.2										

\* Denotes Inter-Division/Inter-Section/Inter-Commission Joint Meeting

# **AGENDA FOR XXVIth COUNCIL MEETING**

**Washington, DC, 21 and 23 July 1971**

1. Finalization of Agenda
2. Approval of Minutes of XXVth Council Meeting
3. Announcement of Nominations for Officers and Bureau Members
4. Announcement of Time of Elections
5. Statutory Report of President on State of the Union
6. Biennial Report of Treasurer
7. Report of Finance Committee
8. National Adhering Organizations: Applications and Changes of Category
9. Applications for Associated Organization Status
10. Tentative Budgets for 1972 and 1973
11. Dues Structure
12. Fixing Annual Dues for 1972 and 1973
13. Reports of Division Presidents and Clinical Chemistry Section
14. Report of Committee on Teaching of Chemistry
15. Report on Publications
16. Adoption of Tentative and Final Nomenclature Rules
17. Bureau Proposals for New Units
18. Ratification of Decisions taken by Bureau and Executive Committee since XXVth Conference
19. Location of Official Headquarters for Next Four Years (Statute 4.3)
20. Language for Official Records for Next Four Years (Statute 5.405)
21. Elections
22. Ratification of Dates and Place of XXVIIth Conference and XXIVth Congress
23. Place of XXVIIIth Conference and XXVth Congress
24. Any Other Business (Discussion only)



## **OFFICIAL DELEGATES OF NATIONAL ADHERING ORGANIZATIONS AT XXVIth CONFERENCE\***

(as at 23 April, 1971)

### **Argentina (2)**

### **Australia (6)**

Prof. A. R. H. COLE, School of Chemistry, University of Western Australia, Nedlands, Western Australia (Australia 6009) (Leader of Delegation)

Dr. I. BROWN, Division of Applied Chemistry, Commonwealth Scientific and Industrial Research Organization, POB 4331, GPO Melbourne, Victoria (Australia 3001)

Dr. R. D. BROWN, Department of Chemistry, Monash University, Clayton, Melbourne, Victoria (Australia)

Dr. D. D. PERRIN, Department of Medical Chemistry, John Curtin School of Medical Research, Australian National University, POB 4, Canberra, ACT (Australia 2600)

Dr. D. H. SOLOMON, Division of Applied Chemistry, Commonwealth Scientific and Industrial Research Organization, POB 4331, GPO Melbourne (Australia 3001)

Dr. D. E. WEISS, Division of Applied Chemistry, Commonwealth Scientific and Industrial Research Organization, POB 4331, GPO Melbourne, Victoria (Australia 3001)

Bureau Member:

Dr. A. L. G. REES (President of IUPAC), Division of Chemical Physics, Commonwealth Scientific and Industrial Research Organization, POB 160, Clayton, Victoria (Australia 3168)

### **Austria (2)**

Bureau Member:

Prof. H. MALISSA, Institut für Analytische Chemie und Mikrochemie der Technischen Hochschule Wien, Getreidemarkt 9, A-1060 Wien (Austria)

### **Belgium (6)**

Dr. M. VAN RYSELBERGHE, Laboratoire belge de l'Industrie électrique, Rhode-St-Genèse (Belgium)

Prof. G. DUYCKAERTS, Institut de Chimie et Métallurgie, Université de Liège au Sart Tilman, B-4000 Liège (Belgium)

Bureau Member:

Prof. G. SMETS, Laboratoire de Chimie macromoléculaire, Université de Louvain, Celestijnenlaan 200 F, B-3030 Heverlee, Leuven (Belgium)

### **Brazil (2)**

### **Bulgaria (2)**

\*Unless he is also an Official Delegate from a National Adhering Organization, a Bureau Member is entitled to vote only on scientific matters.

An Observer or Secretary to a Delegation is not entitled to vote on any matter.

## **Canada (6)**

### **Bureau Members:**

- Dr. P. R. GENDRON, Pulp and Paper Research Institute of Canada, 570 St. John's Boulevard, Pointe Claire 720, Quebec (Canada)  
Dr. G. WADDINGTON (President of IUPAC Physical Chemistry Division), 2950 Foul Bay Road, Victoria, British Columbia (Canada)  
Dr. W. GALLAY (President of IUPAC Applied Chemistry Division), E. B. Eddy Co., Hull, Quebec (Canada)

## **Colombia (2)**

## **Cuba (1)**

## **Czechoslovakia (4)**

- Prof. V. HEROUT, Institute of Organic Chemistry and Biochemistry, Czechoslovak Academy of Sciences, Flemingovo náměstí 2, Praha 6-Dejvice (Czechoslovakia) (Leader of Delegation) (also Bureau Member)  
Prof. J. GAŽO, Chem. techn. Fakulta SVŠT, Jánska 1, Bratislava (Czechoslovakia)  
Prof. J. KORYTA, Polarografický Ustav J. Heyrovského, Československá Akademie Věd, Optletalova 25, Praha 1 (Czechoslovakia)  
Dr. M. PROTIVA, Výzkumný Ustav pro Farmacii a Biochemii, Kouřimská 17, Praha 3-Vinohrady (Czechoslovakia)

### **Bureau Member:**

- Prof. O. WICHTERLE (President of IUPAC Macromolecular Division), Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Petřiny 1888, Praha 6 (Czechoslovakia)

## **Denmark (6)**

- Prof. S. VEIBEL, Organisk-Kemisk Laboratorium, Danmarks Tekniske Højskole, Bygning 201, DK-2800, Lyngby (Denmark)  
Dr. R. DYBKAER, De Gamles By, Department of Clinical Chemistry, Nørre Alle 41, DK-2200 København N (Denmark)  
Mr. P. H. FINK-JENSEN, A/S Sadolin og Holmblad, Holmbladsgade 70, DK-2300 København S (Denmark)  
Prof. K. A. JENSEN, Kemisk Laboratorium II, H.C. Ørsted Institutet, Universitetsparken 5, DK-2100 København Ø (Denmark)  
Prof. A. KJAER, Organisk-Kemisk Laboratorium, Danmarks Tekniske Højskole, Bygning 201, DK-2800 Lyngby (Denmark)

## **Finland (4)**

- Prof. H. SUOMALAINEN, Finnish State Alcohol Monopoly (Alko), POB 10350, Helsinki 10 (Finland) (also Bureau Member)  
Dr. J. LARINKARI, Federation of Finnish Chemical Industries, POB 13028, Helsinki 13 (Finland)

## **France (6)**

### **Bureau Members:**

- Prof. J. BÉNARD (Vice-President of IUPAC), École nationale supérieure de Chimie, Université de Paris, 11 rue Pierre et Marie Curie, F-75 Paris 5<sup>e</sup> (France)  
Prof. J. LECOMTE, 6 rue de l'Alboni, F-75 Paris 16<sup>e</sup> (France)  
Prof. R. TRUHAUT, Chaire de Toxicologie, Faculté de Pharmacie, Université de Paris, 4 avenue de l'Observatoire, F-75 Paris 6<sup>e</sup> (France)

### **Germany (6)**

- Prof. O. GLEMSER, Anorganisch-Chemisches Institut der Universität Göttingen, Hospitalstrasse 8-9, D-3400 Göttingen (Germany) (also Bureau Member, President of Inorganic Chemistry Division)
- Dr. W. FRITSCHKE, Gesellschaft Deutscher Chemiker, Postfach 119075, Carl Bosch-Haus, Varrentrappstrasse 40-42, D-6000 Frankfurt/Main 8 (Germany)
- Prof. O. HORN, Seebachstrasse 8, D-6230 Frankfurt/Main 80 (Germany)
- Prof. W. KLEMM, Anorganisch-Chemisches Institut der Westfälische Wilhelms-Universität, Gievenbecker Weg 9, D-4400 Münster/Westfalen (Germany)
- Dr. H. BEHRENS, DECHEMA, Postfach 970146, Theodor-Heuss-Allee 25, D-6000 Frankfurt/Main 97 (Germany)
- Dr. R. WOLF, Gesellschaft Deutscher Chemiker, Postfach 119075, Carl-Bosch Haus, Varrentrappstrasse 40-42, D-6000 Frankfurt/Main 8 (Germany)

### **Greece (1)**

### **Hungary (2)**

- Prof. G. SCHAY, Central Research Institute for Chemistry, Hungarian Academy of Sciences, Pusztaszeri út 57-69, Budapest II (Hungary)
- Prof. M. T. BECK, Institute of Physical Chemistry, Kossuth Lajos University, Debrecen 10 (Hungary)

### **India (4)**

- Dr. ATMA RAM, Council of Scientific and Industrial Research, Rafi Marg, New Delhi 1 (India)
- Prof. S. RANGASWAMI, Department of Chemistry, University of Delhi, Delhi-7 (India) (also Bureau Member)
- Prof. N. V. SUBBA RAO, Department of Chemistry, University College of Science, Osmania University, Hyderabad-7 (India)

### **Ireland (1)**

- Prof. D. C. PEPPER, Chemical Laboratory, Trinity College, University of Dublin, Dublin 2 (Ireland)

### **Israel (4)**

### **Italy (6)**

- Prof. G. SARTORI, Istituto di Chimica generale ed inorganica, Università di Roma, Piazzale delle Scienze 5, I-00100 Roma (Italy) (also Bureau Member)
- Prof. L. MALATESTA, Istituto di Chimica generale dell'Università di Milano, Via G. Venezian 21, I-20133 Milano (Italy)

### **Japan (6)**

- Prof. H. AKAMUTU, Department of Chemistry, University of Tokyo, Bunkyo-ku, Tokyo (Japan)
- Dr. K. HOSHINO, Toray Industries Inc., 2 Nihonbashi-muromachi 2-chome, Chuo-ku, Tokyo 103 (Japan)
- Prof. M. OKI, Department of Chemistry, University of Tokyo, Bunkyo-ku, Tokyo (Japan)
- Prof. Y. MORINO, Sagami Chemical Research Centre, 3100 Onuma, Sagami-hara-shi, Kanagawaken (Japan)



Prof. S. SHIBATA, Faculty of Pharmaceutical Sciences, University of Tokyo, Bunkyo-ku, Tokyo (Japan) (also Bureau Member)

Prof. N. TANAKA, Department of Chemistry, Faculty of Science, Tohoku University, Sendai (Japan)

**Mexico (2)**

**Netherlands (6)**

**New Zealand (2)**

Prof. C. J. WILKINS, Department of Chemistry, University of Canterbury, Christchurch 1 (New Zealand)

**Nigeria (1)**

**Norway (4)**

**Poland (4)**

Prof. W. KEMULA, Instytut Chemii Fizycznej, Polskiej Akademii Nauk, Ul. Kasprzaka 44-52, Warszawa 42 (Poland) (also Bureau Member, President of IUPAC Analytical Chemistry Division)

**Portugal (2)**

**Republic of China (4)**

Mr. T. J. CHEN, Chinese Chemical Society, POB 609, Taipei, Taiwan (Republic of China)

Dr. P. L. C. HAO, Chinese Chemical Society, POB 609, Taipei, Taiwan (Republic of China)

**Republic of Korea (2)**

Dr. DONG IL KIM, Korean Chemical Society, 199 Dongsung-Dong, Seoul (Republic of Korea)

Dr. SANG UP CHOI, Korean Chemical Society, 199 Dongsung-Dong, Seoul (Republic of Korea)

**Republic of South Africa (4)**

Dr. P. C. CARMAN, National Chemical Research Laboratory, Council for Scientific and Industrial Research, POB 395, Pretoria (Republic of South Africa)

Prof. G. W. PEROLD, Department of Chemistry, University of the Witwatersrand, Johannesburg, Pretoria (Republic of South Africa)

Dr. R. G. SHUTTLEWORTH, South African Embassy, 3051 Massachusetts Avenue NW, Washington, DC 20008 (USA)

Prof. A. M. STEPHEN, Department of Chemistry, University of Cape Town, POB 594, Cape Town (Republic of South Africa)

**Republic of Vietnam (2)**

Prof. LE-VAN-THOI, Atomic Energy Office, POB Q-16, Saigon (Republic of Vietnam)

**Romania (2)**

Prof. C. SIMONESCU, Academy of the Socialist Republic of Romania, Section of Chemistry, Calea Victoriei 125, București (Romania)

Prof. C. DRAGULESCU, Bazei de cercetări științifice a Academiei Republicii Socialist România, Bulevardul Mihai Viteazul Nr. 24, Timișoara (Romania)

### **Spain (4)**

- Dr. R. MADRONERO, Centro Nacional de Química Organica, Juan de la Cierva, Madrid (Spain)  
Prof. R. PEREZ-OSSORIO, Faculty of Sciences, University of Madrid, Madrid (Spain)

### **Sweden (6)**

- Dr. C. O. GABRIELSON, Swedish Board for Technical Development, Fack, S-100 72 Stockholm 43 (Sweden)  
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Prof. B. RÅNBY, Department of Polymer Technology, Royal Institute of Technology, S-100 44 Stockholm 70 (Sweden)  
Dr. I. WADSÖ, Chemical Center, Thermochemistry, University of Lund, POB 740, S-220 07 Lund 7 (Sweden)  
Prof. G. WIDMARK, Institute of Analytical Chemistry, University of Stockholm, Roslagsvägen 90, S-104 05 Stockholm 50 (Sweden)  
Dr. G. AULIN-ERDTMANN, Svenska Nationalkommittén for Kemi, Wenner-Gren Center, S-113 46 Stockholm (Sweden)

### **Switzerland (6)**

- Prof. H. SCHMID, Organisch-Chemisches Institut der Universität Zürich, Rämistrasse 76, CH-8001 Zürich (Switzerland)  
Dr. G. ANDEREGG, Laboratorium für Anorganische Chemie der Eidgenössische Technische Hochschule, Universitätstrasse 6-8, CH-8006 Zürich (Switzerland)  
Dr. M. C. SANZ, Institut Battelle, 7 route de Drize, CH-1227 Carouge-Genève (Switzerland) (also Bureau Member, Chairman of IUPAC Clinical Chemistry Section)  
Dr. W. G. STOLL, Firma J.R. Geigy AG, CH-4000 Basel 21 (Switzerland)  
Prof. C. TAMM, Institut für Organische Chemie der Universität Basel, St. Johannisring 19, CH-4000 Basel (Switzerland)

Bureau Member:

- Dr. R. MORF (Secretary General of IUPAC), POB 165, CH-8058 Zürich Airport (Switzerland)

### **Turkey (1)**

### **Union of Soviet Socialist Republics (6)**

Bureau Member:

- Prof. V. N. KONDRATIEV (Past-President of IUPAC), Institute of Chemical Physics, Academy of Sciences of USSR, Vorobyevskoye chaussee 2-b, Moscow V-334 (USSR)

### **United Arab Republic (2)**

### **United Kingdom (6)**

- Prof. D. H. R. BARTON, Department of Chemistry, Imperial College of Science and Technology, Imperial Institute Road, London SW 7 (UK) (Leader of Delegation) (also Bureau Member, President of IUPAC Organic Chemistry Division)  
Prof. P. J. GARNER, Department of Chemical Engineering, University of Birmingham, POB 363, Birmingham 15 (UK)

Sir HARRY MELVILLE, Queen Mary College, Mile End Road, London E 1 (UK)

Prof. T. M. SUGDEN, Shell Research Ltd., Thornton Research Centre, POB 1, Chester (UK)

Sir HAROLD THOMPSON, St. John's College, Oxford OX1 3JP (UK) (also Bureau Member)

Prof. T. S. WEST, Department of Chemistry, Imperial College of Science and Technology, Imperial Institute Road, London SW 7 (UK)

Secretary to Delegation:

Sir DAVID MARTIN, The Royal Society, 6 Carlton House Terrace, London SW 1 (UK)

#### **United States of America (6)**

Dr. B. RIEGEL, G.D. Searle & Co., Chicago, Illinois 60680 (USA) (Leader of Delegation)

Dr. E. M. BEAVERS, Research Laboratories, Rohm & Hass Co., Spring House, Pennsylvania 19477 (USA)

Prof. V. C. BOEKELHEIDE, Department of Chemistry, University of Oregon, Eugene, Oregon 97403 (USA)

Dr. R. W. CAIRNS, Hercules Inc., Wilmington, Delaware 19898 (USA)

Prof. J. J. MARTIN, Department of Chemical Engineering, University of Michigan, Ann Arbor, Michigan 48104 (USA)

Prof. C. G. OVERBERGER, Department of Chemistry, University of Michigan, Ann Arbor, Michigan 48104 (USA)

Secretary to Delegation:

Dr. M. A. PAUL, Division of Chemistry and Chemical Technology, National Research Council, National Academy of Sciences, 2101 Constitution Avenue, Washington, DC 20418 (USA)

Bureau Members:

Prof. J. C. BAILAR, JR. (Treasurer of IUPAC), Department of Chemistry and Chemical Engineering, University of Illinois, Urbana, Illinois 61801 (USA)

Mr. P. M. ARNOLD, Phillips Petroleum Co., Bartlesville, Oklahoma 74003 (USA)

#### **Venezuela (1)**

#### **Yugoslavia (2)**

## **OFFICIAL DELEGATES OF ASSOCIATED ORGANIZATIONS AT XXVIth CONFERENCE\***

### **European Federation of Chemical Engineering**

Dr. D. BEHRENS, DECHEMA, Postfach 970146, Theodor-Heuss-Allee 25, D-6000 Frankfurt/Main 97 (Germany)

\*These Delegates have the status of Observer and they are not entitled to vote on any matter.



# REPORTS OF IUPAC BODIES

## SECTION ON OILS AND FATS

Stockholm, 3-4 September 1970

*Present:* Dr. E. HEINERTH (Chairman), Mr. H. J. Vos (Secretary), Dr. P. B. CZEDIK-EYSENBERG, Dr. G. LOEW, Dr. K. A. WILLIAMS (Titular Members); Dr. J. A. CORNELIUS, Prof. E. L. DELVAUX, Mr. B. GULLBRANDSON, Mr. A. PETERSEN (Associate Members); Mr. J. E. BERTRAND, Mr. S. B. LINTZ CHRISTENSEN, Prof. C. PAQUOT, Dr. H. J. HEINN, Prof. R. MONACELLI, Ir. J. B. ROOS, Dr. J. GRACIAN-TOUS, Dr. R. OHLSON, Dr. H. BRÜSCHWEILER, Dr. A. D. SCOTT (National Representatives); Mr. A. T. MØLLER, Dr. H. H. R. H. WENDT, Mr. J. C. VAN DER WEEL, Dr. Ö. LEVIN, Dr. P. R. E. LEWKOWITSCH, Mr. B. MCGWYNNE, Dr. B. JACOBSBERG, Dr. C. CAROLA, Dr. P. W. HENDRIKSE, Dr. R. MARCUSE, Dr. U. PERSMARK, Dr. B. TÖREGÅRD (Observers).

Apologies for absence were received from: Ing. M. MALENICKÝ, Dr. N. EMBREE, Prof. G. JACINI (Titular Members); Dr. H. HADORN, Prof. M. NAUDET, Prof. A. RUTOWSKI, Mr. J. -P. WOLFF (Associate Members); Dr. J. POKORNÝ, Dr. A. JAKUBOWSKI, Dr. E. M. GALLEE, Mr. S. G. BROOKER (National Representatives).

### Membership

The following nominations for National Representatives were approved: Prof. J. HOLLÓ (Hungary), Prof. J. G. KANE (India), Mr. B. MCGWYNNE (Ireland). Dr. HEINZ (Germany) submitted his resignation and was replaced as National Representative by Dr. M. TEUPEL. Dr. CZEDIK-EYSENBERG announced the death of Prof. G. GORBACH and the retirement as National Representative of Prof. L. SCHMID (Austria).

### Chairman's Report

Dr. HEINERTH reported satisfactory liaison with other organizations studying analytical methods in the field of oils and fats particularly the various ISO Technical Committees.

### Minutes of Cortina d'Ampezzo Meeting

The minutes of the meeting held on 2nd July 1969 were approved unanimously.

### Work Programme 1969-70

(a) *Determination of Chlorinated Pesticides in Edible Oils and Fats.* Dr. HEINERTH reported that satisfactory results had not been obtained. He proposed that a Working Group under the Chairmanship of Prof. DELVAUX should reexamine the two methods using new standards. This Group should report back at the next meeting. Prof. DELVAUX felt that the Mills method gave satisfactory results but was lengthy and time consuming. The Singh method was simpler but had not been examined in depth. A meeting of the Working Group was held on 3rd September to discuss future work.

(b) *Determination of Elaidic Acid*

i. *Method proposed by French Delegation.* On the whole this method gave results comparable to those obtained by the infrared method for samples of

olive oil containing more than 1 % of elaidic acid. For samples with less than 1 %, which were of great importance, the French method appeared to be more satisfactory. A Working Group under Prof. PAQUOT was asked to prepare a report for the next meeting after further work with the French method.

ii. *Method proposed by Italian Delegation.* The Section was agreed that a method based on gas chromatography using capillary columns would be that of the future. The Chairman proposed that the Italian Members should work with the French Members on the preparation of a joint report for submission at the next meeting.

(c) *Determination of Trans Fatty Acids by Infrared Spectrophotometry.* Satisfactory results had been obtained with the proposed method. However, a revised text was being prepared by the Dutch Delegation. This would be circulated for comment by the Section. Attention was drawn to difficulties in obtaining sufficiently pure standards of elaidic acid methyl ester and of trielaidate for use in the method.

### **Work Programme 1970-71**

In addition to the four methods described above, upon which further work was to be carried out, the Section discussed the following projects.

*Study of Melting Behaviour.* Prof. PAQUOT thought such a programme was important particularly with regard to lard. It was agreed to carry out a study using the apparatus proposed by Prof. PAQUOT, though there would be no objection if commercially available apparatus was also used. The Dutch Delegation would provide the samples.

### **New Texts of Standard Methods**

The assistance of the IUPAC Secretariat would be sought in the preparation for publication of a large number of methods that had received approval by the Section in recent years.

### **Methods to be Approved**

1. (a) *Fat Stability* (AOCS method)
- (b) *Accelerated Oxidation Test* (ISO method)

Since the ISO and AOCS methods were completely different, though both were concerned with the stability of oils and fats and gave valuable information, after a lengthy discussion it was proposed that the AOCS method be adopted immediately because it had been applied officially for a long time. When the final text of the ISO method had been approved this too should be adopted by the Section. Mr. MØLLER drew attention to a further method (Heide-Jensen) based on oxygen absorption and it was agreed to study this method in the next programme of work.

2. *Solid Fat Index.* The Chairman recalled that at the meeting in Cortina d'Ampezzo it had been agreed not to study this method, since the Section had already adopted a procedure for the measurement of dilation. Now a proposal had been received from BSI regarding this method. However, the UK Delegation preferred a method proposed by Dr. SCOTT. This was basically the same as that suggested by the Netherlands. It was agreed that a UK version of the latter text be circulated to the Section Members for comment.

3. (a) *Nachweis der Raffination von Schweineschmalz* [D.G.G.-Einheitsmethoden C-VI 8 (61)]

(b) *Determination of Specific Extinction of Animal Fats in Ultraviolet Light*

It was agreed to adopt the latter text after inclusion of modifications proposed by France.

4. *Gossypol in Oils*. Objections to the proposed method were raised by Dr. CORNELIUS who pointed out that the method involved the use of a carcinogenic substance. He was in contact with AOCS to find out whether another method without toxic reagents was being prepared.

5. *Soap in Oils and Fats*. The BSI procedure, based on that of Wolff, was not being revised. Since ISO was also preparing a method on this subject it was agreed to delay final adoption until the new method had been studied.

6. *Palm Oil Bleaching Test*. The Working Group was unable on the basis of tests to date to make specific recommendations. The work programme would be continued.

7. *Determination of Glycerol*. Dr. HEINERTH reminded the meeting that an official IUPAC method existed. However, ISO was preparing a modified report. It was agreed to await publication of this report and the results of the collaborative tests before proceeding further.

8. *Determination of Arsenic in Glycerol*. It was agreed to submit modifications of the proposed method for consideration by the IUPAC Coordinating Committee. The method would then be adopted.

9. *Determination of MONG*. The method proposed by the UK Delegation was adopted unanimously.

10. *Determination of Small Quantities of Glycerol in Soaps*. It was agreed to adopt the French and UK texts of the ISO method.

11. *Determination of Sodium and Potassium in Soaps*. It was agreed to postpone any collaborative study on the proposed method.

12. *Preparation of Methyl Esters*. A standard method had been published in France in which three procedures were given for the preparation of methyl esters:

(a) for fats and oils with acid value less than 2

(b) for fats and oils with acid value more than 2

(c) for fatty acids and phospholipids (after saponification) with  $\text{BF}_3$

Dr. HEINERTH recalled that the Section had already approved two methods, one proposed by the Netherlands and the other by France. It was agreed to replace the latter method by those described in the new French standard text. The method submitted by the Netherlands which was in agreement with that of AOCS had some disadvantages:

(a) unsaponifiable matter was not eliminated

(b) loss of methyl esters of short chain fatty acids which were more volatile and more soluble in methanol and water than those of long chain fatty acids

With regard to the question of unsaponifiable matter it was pointed out that neither the French nor the AOCS method eliminated such matter and any modification of the Netherlands method to eliminate unsaponifiable matter would render it more laborious and less attractive. Consequently, it was proposed to insert the following footnote in all methods.

'Unsaponifiables are not removed and if present in large amounts they may interfere with subsequent analysis.'

13. *Determination of Bömer Value*. Dr. HEINERTH said that ISO had adopted two methods for this determination, one involving ethyl oxide as solvent and the other using acetone. This determination was frequently used in commerce as a test for the purity of lard, and the mentioned methods had been adopted by CEE. The ethyl oxide method had originated in this Section and it was agreed to adopt the ISO texts of this method as well as the one involving acetone for publication.

14. *Documentation Service*. A letter had been received from Prof. JACINI concerning a documentation service in the field of oils and fats. It would



involve exchange of ideas, information, and abstracts. Doubts were expressed by several Members as to the need for such a service. Attention was drawn to similar services provided by CID and ITERG. It was agreed to consider a more detailed proposal at the next meeting.

15. *Ultraviolet Spectrophotometry. Determination of Linoleic Acid and Linolenic Acid.* BSI had proposed a method for the determination of these acids by ultraviolet spectrophotometry. It was decided not to revise the procedure adopted by the Section several years ago.

### **Dates and Places of Future Meetings**

1971. By special permission of the IUPAC Executive Committee the meeting would be held in St. Gallen, Switzerland, on 1-2 July.

1972. This meeting would be held in UK in September, near London.

1973. The Section would meet during the XXVIIth IUPAC Conference to be held in Hamburg, Germany.

1974. An invitation to meet in Poland was provisionally accepted by the Section.

### **Any Other Business**

(a) It was agreed that the Secretary should reply to the letter from Anderson-Clayton Foods requesting information on the determination of protein content of meal.

(b) Dr. HENDRIKSE drew attention to the confusion in numbering Appendices. It was not always clear to which report they referred. The Secretary promised to bear this in mind in future.

(c) Ir. ROOS asked whether it was possible to print the texts of methods only on one side of the paper. Mr. VOS pointed out that this would involve extra postage costs. After further discussion it was agreed to continue the present system.

H. J. Vos

## **SECTION ON ORGANIC COATINGS (VI.6)**

**Copenhagen, 10-11 September 1970**

*Present:* Mr. P. H. FINK-JENSEN (Chairman), Mr. A. TOUSSAINT (Secretary), Prof. K. H. HAMANN, Dr. J. A. W. VAN LAAR, Dr. L. A. O'NEILL, Prof. D. PAGANI, Mr. V. ZVONAR (Titular Members); Dr. F. H. DE LA COURT, Mr. G. CHRISTENSEN, Dr. K. M. OESTERLEE, Mr. H. K. RAASCHOU NIELSEN, Dr. D. WAPLER (Associate Members); Mr. B. HEMBERG (National Representative); Mr. A. ROMAC (Observer).

Apologies for absence were received from: Mr. M. A. GLASER (Titular Member); Dr. U. ZORLL (Associate Member); Mr. A. CAILLIEZ, Dr. H. W. TALEN, Dr. M. HOCHWEBER, Mr. A. R. H. TAWN, Dr. N. P. BECKWITH (National Representatives).

1. Since no objections or remarks were made, the minutes of the Cortina d'Ampezzo meeting were approved.

### **2. Assessment of Application Properties of Brushing Paints**

Mr. FINK-JENSEN reported briefly on the correspondence with Dr. GALLAY, President of the Applied Chemistry Division. The latter agreed entirely with

the view put forward by Mr. FINK-JENSEN that this material was only suitable for highly specialized readers who might never read *Pure and Applied Chemistry*. It should be published in national paint journals to reach those most interested in the subject. A final decision was awaited from the IUPAC Executive Committee. The Members supported the view that publication should take place in paint journals with due credit to IUPAC. It was suggested that the report be published in German, French, Russian, and Italian by national paint journals.

### 3. Monograph Series

Mr. FINK-JENSEN commented on the report in the last OCS circular dealing with this project. Briefly, the IUPAC Executive Committee had accepted the monograph series as an IUPAC series, but later it turned out that payment of fees to authors was not permitted according to IUPAC publication policy. Fees to authors were, however, considered a necessity by the Preparatory Committee (FUNKE, TAWN, FINK-JENSEN). Mr. FINK-JENSEN had recently visited the IUPAC Secretariat to try and find a solution which, unfortunately was not achieved. Thus, it appeared that the project could not be implemented under the auspices of IUPAC at present. The problem would again be discussed in October 1970 by the IUPAC Bureau but a positive outcome was not likely. It was with regret, therefore, that the Monographs Preparatory Committee had decided to proceed without IUPAC in spite of the fact that publication under its auspices would have been very helpful. A start had to be made without further delay. Some publishers had been contacted, amongst which the most interested were Iliffe, Elsevier, and Springer.

A majority of Members supported the views of the Preparatory Committee and the following statement was agreed: 'The OCS Members regard the new review journal as most important to the paint field and want as a group to give all possible support to the enterprise. An official connection between the journal and OCS should—to the benefit of OCS and IUPAC—be created as soon as possible. The Chairman is asked to help the journal to come into existence in the immediate future under the best possible conditions regarding the future of the journal.'

### 4. Postgraduate Training

The following summary was given by Prof. HAMANN, Chairman of the Working Group.

In dem einführen den Referat zu diesem Punkt geht Prof. HAMANN noch einmal auf die Gründe für die Fortbildung ein. Er weist auf der Unterschied von Ausbildung und Fortbildung hin. Unter Ausbildung wird das einmalige Vermitteln von Wissen verstanden, das der beruflichen Tätigkeit vorausgeht. Diese Ausbildung musste bisher für ein ganzes Berufsleben ausreichen. Bei der schnellen Entwicklung von Naturwissenschaft und Technik ist das durch eine solche ausbildung vermittelte Wissen nicht mehr für ein ganzes Lebensausreichend. Dieses war nur möglich, in einer Arbeitswelt, die sich nur langsam weiterentwickelt. Wir stehen augenblicklich in der zweiten industriellen Revolution. Wir haben keine statische Berufssituation mehr.

Es ist notwendig, dass alle im Beruf stehenden sich auch während der Tätigkeit innerhalb der Berufes fortbilden. Deshalb ist die Frage der Fortbildung so wichtig. In Cortina wurde beschlossen, dass die Vertreter der einzelnen Länder Prof. HAMANN mitteilen welche Möglichkeiten zur Fortbildung in ihrem Landen bestehen. Die erhaltenen Antworten sind sehr

unterschiedlich Prof. HAMANN hat die Antworten für die einzelnen Ländern zusammengestellt. Er bittet darum, dass diese Zusammenstellungen durchgesehen und corrigiert werden und dann an ihn zurückgeschickt werden. Wenn es möglich ist, sollen Beispiele für Fortbildungsmöglichkeiten in den einzelnen Ländern gegeben werden. In der Diskussion wurde abgesprochen, dass auch Themenvorschläge für Fortbildungskurse genannte werden sollen.

Prof. HAMANN wird, wenn er alle Antworten erhalten hat, einen kurzen Bericht machen, der an alle Herren verteilt wird. Auf der Nächsten Tagung kann dann darüber diskutiert werden, in welcher Form diese Bericht veröffentlicht werden soll.

## 5. Adhesion Project

The proposal of the Cortina d'Ampezzo meeting was approved without change. Dr. VAN LAAR, Chairman of the Working Group, gave a short survey of the actual situation regarding the monograph on adhesion.

*Literature Contribution.* Books had been sent to VAN LAAR by HAMANN, ZORLL, HEMBERG, PROSSER, WAPLER, OESTERLE, ZVONAR. He expressed his cordial thanks, but pointed out that he would be thankful to receive books which were considered important but not easily obtainable (congress books for instance); full publication in photocopy; regarding Soviet papers, indications of abstracts in Western languages. Dr. OESTERLEE said that he could not make photocopies without payment. The Secretary would ask the IUPAC Secretariat about the possibility of using IUPAC funds. Dr. VAN LAAR would inform the Members about which photocopies he had received in order to avoid duplication of work.

*Contents.* The monograph would contain the chapters agreed upon in Cortina d'Ampezzo. However, an initial chapter on definition seemed indispensable:-

Introductory chapter: What is adhesion?

Practical phenomena

Analysis of loss of adhesion

Tests methods

Nature of adhesion—Influence of conditions

Influence of the bulk

Comparison with practice

Conclusion

*Continuation of Editorial Work.* Dr. VAN LAAR presumed that necessarily the work would resemble his own earlier publication to some extent. It was suggested that cooperators read this paper in order to facilitate the discussion about the present scheme. Up to the end of 1970, he would have to restrict himself to presentation of his wishes to Members as to the supply of literature. From the beginning of 1971 he would have more time to work out the proposals made.

## 6. Analytical Methods

(a) *Alkyd Resins.* The final text had been read by Dr. O'NEILL (Chairman of the Working Group), Dr. DE LA COURT, and Mr. TOUSSAINT. It had also been translated into French by Mr. TOUSSAINT who also put it into definitive form ready for publication. The Members considered that this work should be published in booklet form as was done for the analysis of drying oils. However, the French version should be printed in its entirety after the English text, and not be intermingled as in the previous booklet on drying oils. The final text would, as soon as it was ready, be sent to the Chairman who would



forward it to the IUPAC Secretariat for publication in *Pure and Applied Chemistry*.

(b) *Acrylic Resins*. Seven laboratories had sent their results: Denmark (2), Norway (1), Germany (1), Belgium (1), UK (2), to Dr. O'NEILL. The analytical techniques used were: infrared spectroscopy, NMR, GLC and pyrolysis. It appeared to all participants that a full and complete analysis of the acrylic resins was very difficult if not quite impossible. Everybody had found qualitatively and quantitatively the main constituents of the four resins provided by Dr. O'NEILL, but practically no one had been able to give the name and the percentage of the minor constituents, while giving, however, qualitatively the organic functional groups present. The techniques involved had been essentially the same for all participants. It was decided to discontinue the work. However, some Members intended to investigate some modified techniques: saponification with a mixture of KOH (10 g), DMSO (25 g), sample (2.5 g), water (10 g), under reflux for 2 hours (proposed by Mr. CHRISTENSEN); degradation of the polymers by hydriodic acid and subsequent GLC analysis of the alkyl halides (proposed by Mr. TOUSSAINT). After that but before the next meeting a final report would be written by Dr. O'NEILL who should receive all results before 1st March 1971. It was decided that the complete results from the various sources should be distributed to all participants.

(c) *Future Work*. Those Members concerned with analysis considered that the analysis of polyurethane prepolymers was an important and interesting field to investigate because these types of resin were in continual commercial development.

(d) *Publication of Analytical Work*. The general opinion was that the cooperative analytical work (e.g., on acrylic resin) should be published even if standardized methods could not be suggested. There was a preference for publication in a paint journal or a journal devoted to analytical chemistry for this kind of work.

The participants had found the cooperation very fruitful and hoped it would last.

## 7. Symposia

Prof. HAMANN was busy working out the organization of a symposium under the auspices of IUPAC for the Spring of 1972. Dr. WAPLER proposed *Heat of Wetting* as the theme; Mr. TOUSSAINT and Dr. OESTERLEE considered that *Water in Paint Films or Permeability Phenomena* would be an interesting field; Dr. VAN LAAR preferred to see *Rheology* treated under its mathematical aspect. Mr. FINK-JENSEN and Prof. HAMANN pointed out that if the symposium was to have a high scientific level it must not only attract everyone but also it must allow contact and discussion between everyone. Prof. HAMANN felt also that the number of participants should be limited to about 60. Mr. FINK-JENSEN believed the costs of the symposium should be supported by IUPAC; an official request for financial help would be made through the IUPAC Secretariat. Finally, it was decided that the theme would be connected with the *Effects of Water in Paint Films*. Dr. DE LA COURT would help Prof. HAMANN to decide the exact theme and suggest a programme.

## 8. Information Retrieval

Concerning activities set up in Cortina d'Ampezzo, Mr. RAASCHOU NEILSEN reported that Mr. G. DE W. ANDERSON (Paint Research Station) had sent him a list of addresses of literature services normally used by PRS and Mr.

ZVONÁŘ had forwarded a report concerning literature services in Eastern Europe. Photocopies of this material were distributed to the Members at the meeting. Mr. RAASCHOU NIELSEN had prepared a draft of a questionnaire which was intended to be sent out from OCS. The completed schemes were intended to form the basis for a report about literature services in the paint field. The questionnaire was discussed in detail. Mr. RAASCHOU NIELSEN would prepare a new questionnaire taking into account the various suggestions. It would be sent to the Members for criticism and they would be asked to return it together with a proposal for institutions to whom the questionnaire should be sent.

## 9. New Projects

The proposals set up in the circular accompanying the invitation to this meeting were discussed. The establishment of a list (possibly annual) of research programmes being undertaken in various research laboratories (TNO, PRS, universities) as well as certain industrial laboratories throughout the world seemed interesting to everybody. It was considered doubtful if all such laboratories would provide the necessary information. Mr. FINK-JENSEN thought that in the beginning the list might not necessarily be very comprehensive, but that it could gradually develop its extent through consecutive issues. Mr. TOUSSAINT maintained that this project would be very interesting to the paint field and perhaps convey closer cooperation between the research laboratories. Although the Members agreed to this, it was decided to leave the project in abeyance.

A discussion about a possible atlas or booklet, describing the climatological conditions relevant to the utilization of paint, followed. Various books on climates existed at paint laboratories. Dr. TALEN had, in a letter, drawn attention to the booklet *Marine Fouling, Hydrological and Biological Research* edited by the Directorate for Scientific Affairs of OECD; it contained hydrological and biological data from a number of marine testing stations from all over the world. The Members found the proposed project interesting and agreed that it should contain a list of accessible testing stations, their climate, capacity, dimensions of sample, etc. A start would be made at the next OCS meeting.

In a general discussion about the future of OCS, the Chairman pointed out that its work ought to be performed by a wider selection of nationalities than it now was. The Members were asked to consider and propose new, realistic projects for future work bearing this in mind. Sufficient specialists could not be available within the Section itself and some Commissions might have to be set up. This would only be feasible through more intimate contact with various national organizations.

## 10. Membership

Efforts should be made to increase the activity level of USA. A representative from Japan should be looked for. The representative of France ought to be substituted. It was noted that the Soviet National Representative, Prof. ZUBOV, had so far not responded to any communication from OCS. Prof. PAGANI would contact Dr. BONO to ascertain if he wished to participate; if not, he would look for somebody else. The nomination of Mr. TAWN as National Representative of UK was approved. Mr. ROMAC was suggested as a possible National Representative for Yugoslavia; this status would have to be approved by his National Adhering Organization.

## II. Next Meeting

Since travel to USA was expensive a few Members only would be able to participate in a meeting during the XXVth IUPAC Conference (Washington, DC). It was, therefore, unanimously decided to request that the next meeting be in Europe (Switzerland or UK) in September 1971. However, Mr. FINK-JENSEN should attend the Washington Conference as the Chairman of OCS if this request was approved by the Applied Chemistry Division.

A. TOUSSAINT

### SECTION ON PESTICIDES (VI.5)

Erbach/Rheingau, 14-18 September 1970

The minutes of the Section meeting were published in *Information Bulletin* No. 39 (February, 1971: pp. 54-58). The meetings of its two Commissions, the minutes of which appear hereafter, took place in conjunction with that of the Section.

### COMMISSION ON TERMINAL PESTICIDE RESIDUES (VI.5.1)

Ehrbach/Rheingau, 14-18 September 1970

*Present:* Dr. H. HURTIG (Chairman), Mr. J. W. COOK, Dr. R. A. E. GALLEY, Mr. E. E. KENAGA, Prof. F. KORTE, Dr. P. B. POLEN, Dr. P. E. PORTER, Dr. K. FUKUNAGA, Dr. J. B. MOORE, Dr. K. R. HILL (Secretary); and by invitation Dr. A. KRUYSE (CCPR), Dr. E. E. TURTLE (FAO), Dr. S. DORMAL-VAN DER BRUEL (CEE), Dr. H. MARCHANT (IAEA/FAO), Dr. H. FREHSE, Prof. P. E. KOIVISTOINEN, Prof. G. WIDMARK, Mr. W. BURNS-BROWN, Mr. K. E. ELGAR, Dr. CH. RESNICK, Dr. D. C. ABBOTT, Dr. V. BATORA (Czechoslovakia), Dr. B. J. DE LA GRAVIERE, Dr. W. KLEIN, Prof. D. JERCHER, Dr. G. LEBER, Prof. F. COULSTON, Dr. F. GEISS (CEE). Apologies were received from Dr. G. L. SUTHERLAND and Mr. E. Y. SPENCER who had been invited to attend.

1. Dr. HURTIG welcomed the Members and visitors to the Fifth Meeting of the Commission and introduced Dr. K. FUKUNAGA and visitors to the Members of the Commission. The Chairman moved adoption of the Agenda; this was agreed.

2. The Chairman referred to the Minutes of the Fourth Meeting held on 1st, 2nd and 5th July 1969 which, together with Appendices, had previously been circulated. After minor corrections were indicated, these were agreed.

3. Arising from the Minutes of the Fourth Meeting, the Chairman referred to the following matters:

(a) Dr. POLEN presented a report of the Half-life Working Party (Appendix 1). Following a discussion of the report in which it was stressed that a concept of half-life was useful within a given experiment only, that it should not be extrapolated beyond the measured data, and further that it should not be used to estimate the hazard to wildlife arising from the use of pesticides, Dr. HURTIG proposed that the Members forward their comments in writing to the Working Party for inclusion in a final document to be presented to the Commission next year.

(b) Dr. HILL reported that summaries of the proceedings of the 1969 Meetings would be published in *J. Assoc. Offic. Anal. Chem.*, September 1970 issue; and that the full proceedings of 1969 Meetings had been published in *Comptes Rendus XXV Conference* (p. 168).



4. (a) Dr. MARCHANT's report on the role of the Joint FAO-IAEA Division in Pesticides Research was considered by the Commission. It was agreed that the subject of the collaboration of FAO-IAEA and the Commission needed clarifying. It was noted that an invitation had been received to send an IUPAC observer to the FAO-IAEA Panel Meeting.

(b) Dr. TURTLE presented a draft report of the FAO-WHO Joint Meeting. Suggestions were considered on means of facilitating the transmission of reports from the FAO-WHO Joint Meeting to the Section and Commissions. Arising from the requirements of the Report, the Chairman delegated additional working assignments to appropriate members of the Commission as follows: Mr. COOK—Captan and Folpet, Dr. FUKUNAGA—Fenitrothion, Dr. FREHSE—Dichlofluanid, Dr. HURTIG—Dinocap, Dr. HILL—Hexachlorobenzene, Prof. KORTE—Hexachlorobenzene and Quintozene, Dr. SUTHERLAND—Formothion and Thiometon. Dr. HURTIG assumed responsibility for determining whether Captafol should be considered by the Commission.

5. The Secretary reported that the first edition of the *IUPAC Pesticides Section Newsletter*, edited by Dr. SUTHERLAND, was circulated to the Membership in December 1969 and contained the titles of 15 papers either published or in press on topics previously considered by the Commission. Copies of the Newsletter would be available from the IUPAC Secretariat in Oxford (UK).

## 6. Lindane

The Commission received a report by Dr. HURTIG on progress in elucidating the terminal residues of lindane (Appendix 2). Up to 70% of the residues of lindane- $^{14}\text{C}$  in or on plants were found to be hydrophilic metabolites. No metabolites were found in soil after foliar application in contrast with older reports in the literature. Dr. KLEIN reported on studies in progress which indicated that  $\gamma$ -BHC was not converted to  $\beta$ -BHC in several plants tested. Dr. ABBOTT read a communication from OECD in which the need for analytical methods for hydrophilic metabolites of organochlorine pesticides was expressed. Dr. HURTIG agreed to continue to survey progress on terminal residues of lindane.

## 7. Chlordane

Dr. POLEN presented a report on work completed on the terminal residues of chlordane (Appendix 3). An animal metabolite of chlordane, called oxychlordane ( $\text{C}_{10}\text{H}_4\text{OCl}_8$ ), had been isolated from the fat of pigs fed massive doses of the pure isomers and from milk and cheese produced from cows feeding on alfalfa contaminated with chlordane. Thus far all evidence indicated that oxychlordane was formed only in animals. It was noted that chlordane residues found in the cuticle of root crops, such as potatoes, even after washing, could be accounted for by the incorporation of minute particles of soil in the skin waxes. Prof. KORTE reported on the metabolism of trans-chlordane in white cabbage and carrots (Appendix 4). The Chairman noted that chlordane would be reviewed in the 1970 FAO-WHO Joint Meeting after which an indication should be forthcoming as to whether its requirements on chlordane had been met.

## 8. Cyclodiene Compounds

Dr. PORTER reported on the Working Party on terminal residues of cyclodiene

insecticides (Appendix 5). An important development was the confirmation of the bridged ketone structure of MATSUMURA's dieldrin metabolite F by means of its synthesis. It was noted that the number of metabolites of cyclodiene compounds was increasing and that the need existed to synthesize these compounds in order to evaluate their importance as terminal residues under field conditions. Photo-dieldrin and photo-endrin were significant residues under certain conditions and should be included in any discussion of residues. The Chairman noted that these working papers should be called to the attention of the 1970 FAO-WHO Joint Meeting and that the quantitative occurrence of hydrophilic metabolites and phototransformation products under practical conditions needed to be reported. Arrangements were made to continue to collate and report results on the terminal residues of cyclodiene compounds.

## **9. Other Organochlorine Compounds**

*Toxaphene.* Mr. COOK reported on the terminal residues of toxaphene (Appendix 6). The lack of new information on this subject was noted.

*Chloropropylate and Chlorobenzilate.* Dr. HILL reported on recent studies on the terminal residues of these compounds in plants and animals and of bromobenzilate in soil (Appendix 6). No new metabolites had been identified and there appeared to be very little degradation (<5%) in plants and soil.

*Dicofol.* Prof. KORTE reported that no new information was available on the terminal residues of dicofol.

The Working Parties agreed to continue to collate and report on terminal residues of these organochlorine compounds.

## **10. Carbaryl and Other Carbamates**

Mr. COOK reported on the Working Party on terminal residues of carbaryl and other carbamates (Appendix 7). Recently completed studies reconfirmed previous data on carbaryl. Although information on terminal residues of carbamates other than carbaryl had not been requested of the Commission it was agreed to continue reporting on these compounds as well as carbaryl in order to acquire a useful background of data. The Commission noted the lack of emphasis on terminal residues of carbamates in plants in the literature and encouraged more work in this area.

## **11. Dithiocarbamates**

Although no report was available on the terminal residues of dithiocarbamates the Commission received an indication that the work in progress on these compounds, reported at the Fourth Meeting, 1969, was nearing completion and should be available in 1971. Dr. BATORA indicated where published studies on the mutagenic effects (none were observed) of dithiocarbamates could be found.

## **12. Organophosphorus Compounds**

A report by the Working Party on the terminal residues of organophosphorus compounds was read by the Secretary (Appendix 8). Very little material of significance was available on azinphosmethyl, demeton-S-methyl sulfoxide, coumaphos, or dioxathion. New information was presented on diazinon, dimethoate, parathion, methyl parathion, and phosphamidon. A lack of metabolic studies in plants was noted, most work being conducted with animals. Dr. HURTIG presented unpublished data on the surprising persistence



of some organophosphorus insecticides, especially parathion, in soil in laboratory experiments. The question of whether more work was needed on diazinon and dimethoate was considered by the Commission and it was agreed that advice was needed from FAO-WHO. Arrangements were made to continue to report results on the terminal residues of organophosphorus compounds.

### 13. Fumigants

Mr. KENAGA reported on the chemical nature and distribution of the terminal residues of fumigants (Appendix 9). Attention was directed to the possible new metabolite dimethyl sulfide, formed by decomposition of the methyl bromide-methionone complex in fumigated nuts when heated. The Chairman noted that the Commission's work on fumigants since 1966 had stimulated much research on these compounds and that the Commission was indebted to Mr. KENAGA and Mr. BURNS-BROWN for its present accomplishments. Dr. KRUYSE reported that residue analyses undertaken in the Netherlands had detected small residues of fumigants near to the limits of analytical sensitivity. This had created a need for more knowledge on the toxicity of the fumigants because the fumigants had previously been accepted on a *no residue* basis. The National Institute of Public Health of the Netherlands was working on this subject. Following a discussion of the significance of some of the data presented by Mr. KENAGA, he agreed to revise it to bring in a critical evaluation of the analytical methods. Mr. BURNS-BROWN noted that data was still needed on relative levels of fumigant residues in raw commodities and in food as consumed.

### 14. Rethrins and Synergists

Dr. MOORE reported on completed work on the terminal residues of rethrins and synergists (Appendix 10). New work showing the importance of demethylation in the metabolism of piperonyl butoxide in mammals confirmed that it acted as a liver enzyme inhibitor. New information was also received on the sunlight photodecomposition of pyrethrin residues in grain and on glass surfaces which indicated little change in LD<sub>50</sub> before and after photodegradation. Dr. MOORE indicated that arrangements had been made to study pyrethrin metabolism in primates and man. The requirements of the FAO-WHO Joint Meeting concerning the terminal residues of rethrins and synergists were considered to have been met.

### 15. Other Compounds

*Oxythioquinox*. Hydrolysis of oxythioquinox to 2,3-dithiol-6-methylquinoxaline occurred very easily. No other metabolites of this compound had been reported. Dr. HILL reported that studies on the toxicity and mode of action of oxythioquinox and its dithiol in rats and mice had been published [G. P. CARLSON and K. P. DuBOIS, *J. Pharmacol. Exp. Ther.* **173**, 60 (1970)]. Prof. KORTE reported that studies in plants and animals indicated that the stable dithiol or its conjugate was the major metabolite of oxythioquinox (C. A. ANDERSON, Chemagro Corp., private communication). Dr. RESNICK reported that work was in progress on the residues of oxythioquinox in oranges in Israel.

*Effects of Processing on Residues of Organochlorine Pesticides in Food*. Mr. COOK reported on additional information on the effects of processing on residues of organochlorine pesticides in food (Appendix 11). Dr. HURTIG suggested that this work be expanded to include effects of processing on residues of organophosphorus and carbamate pesticides. Dr. RESNICK



reported that work was in progress in Israel on canned whole fruits, vegetables, and fruit juices, and on frozen foods. Dr. KOIVISTOINEN commented that a report on the effects of processing on dimethoate residues had been communicated directly to FAO.

## 16. Publication

The Secretary was authorized to arrange for publication of the proceedings of the Commission in *IUPAC Information Bulletin* and for a summary to be published in *J. Assoc. Offic. Anal. Chem.* He was further authorized to arrange for copies of unpublished Working Papers to be made available through the IUPAC Secretariat.

## 17. Arrangements for Next Meeting

Dr. HURTIG announced that the next meetings of the Commission would be held during the course of the XXVIth IUPAC Conference (Washington, DC).

K. R. HILL

## Appendix I: Half-life of Pesticide Residues in Plants

The *half-life* concept, long associated with radioactive decay, subsequently had had a useful existence in pharmacology to describe the disappearance of drugs or normal body constituents [such as red blood cells or elements (7)] from man and other animals. This extension to biological systems should be examined in relation to the original concept before our proceeding to the subject of the task force study. The radiodecomposition phenomenon was clearly definable in terms of first-order kinetics wherein an element, by loss of a small particle, was converted to another element. This single radio-nuclear reaction was unambiguous and its kinetics could be expressed as a half-life, easy to verify experimentally.

If, in an animal, a drug disappeared by a single metabolic or excretory pathway, it too could be said to have a biological *half-life*. Should more than one of these pathways exist, a single first-order disappearance expression was no longer possible although the physiological summation of the multiple pathways might deceptively appear to display first-order kinetics for the major proportion of its detectable existence in the animal. Properly, this should be called pseudo first-order disappearance and *half-life* could not readily be conceptually applied. Pharmacologists had, however, misused the concept for so long a period of time that biological (or pharmacological) *half-life* was an everyday pragmatic tool. Its extension (4) to the disappearance of pesticide residues from growing or harvested crops was an obvious one.

In the case of growing crops, pesticide *disappearance* was uncontestedly heterogeneous and even in harvested crops there must be virtually no cases of a single degradative reaction.

Even the term *disappearance* must be used cautiously in pesticide residue studies since the largest factor in the decrease in concentration of pesticides in growing plants was likely to be the dilution effected by plant growth. True chemical transformation of the pesticide was normally the summed effects of volatilization, ultraviolet degradation, mechanical dislodgement by wind and rain, metabolism, atmospheric oxidation, and hydrolysis by plant or atmospheric moisture. The effects of these forces had recently been reviewed by EBELING (1). Temperature, of course, changed the rates of some of these forces. In the case of root crops or of plant systemic compounds applied to the soil, the rate of disappearance of the pesticide in its soil environment determined residue levels in the crop growing in the soil (2). Over compara-

tively short periods of time the *disappearance* data from residue studies approximated a first-order decay curve or series of curves. An examination of typical residue data (3, 5, 8) showed that over an appreciable period of time the curve fit on a semilogarithmic (first-order) plot was usually unsatisfactory. Additionally, compilations of residue data (6) revealed substantial variability from one experiment to another in the slopes of these pseudo first-order decay curves.

Examination of the above circumstances had led the Working Party to the following conclusions:

1. The half-life concept had no basis in theory in the case of the *disappearance* of pesticides from growing crops; the dissipation of residue was an accretion of a variety of causes.
2. While semilogarithmic plots were useful for visualization of residue data, extrapolation of a straight line function for anything other than a short period of time was unjustified.
3. Generalizations could not be made that a given pesticide on a given crop would always *disappear* at the same rate.

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### Appendix 2: Terminal Lindane Residues

The conversion of lindane in and on plants had been recently studied. After application of 5 ppm of lindane-<sup>14</sup>C in greenhouse experiments on cabbage, carrots, and wheat seedlings, up to 70% of the residues detected in or on plants were found to be hydrophilic metabolites. In contrast with older reports in the literature (possibly based on unreliable analytical procedures) no metabolites were found in soil after foliar application, but about 10% of these residues were present in soil as lindane-<sup>14</sup>C (1).

Work currently in progress at Saskatoon, Canada (2) on feeding radio-labelled lindane-<sup>14</sup>C to rabbits indicated 71% excretion in urine and faeces after 22 weeks of feeding as compared with 42% for dieldrin. The metabolites identified to date were trichlorobenzene, 1, 2, 3, 4-tetrachlorobenzene, 1, 2, 3, 5-tetrachlorobenzene, 1, 2, 4, 5-tetrachlorobenzene, gammapentachlorocyclohexane (and another isomer), di-, tri-, and tetrachlorophenols. Similar studies were also in progress with pheasants.

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### Appendix 3: Terminal Residues of Chlordane

*Animal Metabolite of Chlordane.* Analytical evidence for the existence of unrecognized metabolites from pure isomers of chlordane was reported to this Commission at its Third Meeting (1). At that time different metabolites from each of the isomers was suspected. Since then an animal metabolite ( $C_{10}H_7OCl_8$ ) of chlordane, hereafter called oxychlordane (OXY), had been isolated from the fat of pigs fed massive doses of the pure isomers (2) and from milk and cheese produced from cows feeding on alfalfa contaminated with chlordane (3). OXY had been synthesized and a structure had been proposed. Either  $\alpha$ - or  $\gamma$ -chlordane yielded the same metabolite, identical to the synthetic product when judged by analytical parameters (IR, NMR, GLC, TLC), but there were indications that enantiomorphic selection occurred during metabolism (2, 4).

Analytical characteristics of OXY had been described and its propensity for storage in the fat of animals had been studied (4). The Storage Concentration Ratio (residue level in fat divided by level in feed) was a maximum of 0.1 in back fat of cattle fed chlordane for 30 days, 0.24 in pigs fed 90 days, approximately unity in rats or dogs fed chlordane 1-2 years. OXY was not detected in milk of dairy cattle fed up to 0.3 ppm of chlordane (maximum FAO-WHO tolerance) for 30 days. From the relatively low Storage Concentration Ratios observed in supervised feeding trials, it was concluded that the probability was low for amplification of residues in the food chain via a chlordane-oxychlordane mechanism.

OXY was not detected in residues in soil and plants; and evidence indicated thus far that OXY was formed only in animals and did not occur as a constituent of terminal chlordane residues on crops.

*Nomenclature of Chlordane Isomers.* Three systems were now used in the literature to name the principal isomers of chlordane (whose gas chromatographic peaks had been called *signature peaks* [12]). The oldest system had been used since about 1947 by Velsicol, in whose laboratories chlordane was invented. This nomenclature (hereafter System 1) was employed in preparing technical literature, documents for regulatory agencies and in identification of Reference Analytical Standards which were distributed to university researchers, regulatory laboratories, and analysts. System 2 appeared in the technical literature in the early 1950's; System 3 was first used in 1969.

Correct recognition of this nomenclature was essential also to interpretation of literature on technical heptachlor, since  $\gamma$ -chlordane was sometimes a component of its terminal residues.

The systems were correlated in the following table and some literature utilizing each was cited.

Chlordane Isomers  
Correlation of Nomenclature Systems

System 1 (Ref. 5-8) (this paper)	System 2 (Ref. 9-12)	System 3 (Ref. 13)
Alpha-chlordane Gamma-chlordane	Beta-chlordane Alpha-chlordane Gamma-chlordane*	<i>cis</i> -chlordane <i>trans</i> -chlordane

\*Ref. 10 only. This is *not* one of the *signature peaks* isomers.



Unequivocal bases for experimental distinction of the two isomers were the gas chromatographic retention times ( $\alpha$ -chlordane had the greater retention time) and infrared spectra.

*Photoreactions in Terminal Residues of Chlordane.* The possibility of conversion of constituents of residues from technical chlordane by UV *in vitro* had been demonstrated by Korte (14, 15), Benson (16), and Rosen (17), and their coworkers. Whether or not these transformations were of significance in altering the composition of terminal chlordane residues under agricultural conditions needed further evaluation.

Observations of the IUPAC Chlordane Working Party on gas-liquid chromatograms from foliar applications on beans and cabbage appeared to give no new peaks during the ageing of the residues (1) and hence gave no indication of photolytic products. A more recent investigation directed specifically towards evaluation of the effects, if any, of sunlight on chlordane residues also found no significant indications of the production of photolytic products under typical field conditions (18).

*Effects of Food Processing on Chlordane Residues.* SAHA and others had consistently shown that chlordane residues from soil treatments of root crops with either technical chlordane or technical heptachlor, in which  $\gamma$ -chlordane was a component, were concentrated in the peel and that peeling and/or cooking reduced or eliminated the residue (13, 14, 15).

BEVENUE and YEO (22) had demonstrated the effects of processing on removal of chlordane residues from grain products. Wheat flour and rice, each contaminated by exposure to chlordane vapours, were processed to produce two cooked products: a baked cookie and boiled rice. The baked wheat flour cookie contained an average of 50% less residue than the wheat and the cooked rice about 73% less than the raw product.

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#### **Appendix 4: Metabolism of trans-Chlordane in White Cabbage and Carrots**

White cabbage leaves quickly took up *trans*-chlordane after foliar application. Four weeks after application less than 1 % of the residues were found on the leaves' surface, more than 90 % of the residues were found in the leaves. Ten weeks after application total residues amounted to merely 20 % based on the applied radioactivity. This meant that residues disappeared much slower than in the case of the related substance heptachlor.

Soil treatment (carrots) with *trans*-chlordane only resulted in low residues in carrots, namely 0.01 ppm in carrots themselves and 0.06 ppm in their leaves (12 weeks after application). Residues in carrots were mainly metabolites, whereas residues in leaves (about 66% of the radioactivity) consisted of *trans*-chlordane.

Although these tests, carried out under greenhouse conditions which were not under strict control, could not be compared quantitatively with tests carried out under practical conditions, the results revealed nevertheless, that a considerable part of the residues was present in the form of conversion products after chlordane application.

#### **Appendix 5: Terminal Residues of Cyclodiene Insecticides**

An excellent review of the metabolism of cyclodiene insecticides including literature through June 1968, had been prepared by BROOKS (1). Some recent developments in relation to cyclodiene insecticide terminal residues were summarized in the following sections.

MILES, TU and HARRIS (2) had continued their study of the metabolism of heptachlor and its degradation products by soil microorganisms. Heptachlor was epoxidized to heptachlor epoxide. It was also hydrolyzed to 1-hydroxy-chlordene which was epoxidized to 1-hydroxy-2,3-epoxychlordene. They now had evidence that the latter compound was oxidized to 1-keto-2,3-epoxy-chlordene. LICHTENSTEIN *et al.* (3) examined soils which had received aldrin or heptachlor either in one treatment at 25 lb per acre or in five annual treatments of 5 lb per acre per treatment, 10 years after the first treatment. In the case of the single aldrin treatment the soil residues of aldrin plus dieldrin declined roughly logarithmically with time with approximately half



of the residue disappearing each 2.25 years. In the heptachlor treated soils, conversion to the epoxide was slower, but the sum of heptachlor and its epoxide declined logarithmically with time. The time for half disappearance was about 2 years. SAHA and LEE (4) treated fertile clay loam soil with  $^{14}\text{C}$ -dieldrin. After 1 year, in which wheat plants and carrots were grown in the soil, they examined both plants and soil. It was evident that in 1 year in their soil, insignificant dieldrin conversion to other products had occurred. An important development in relation to the soil transformation of aldrin and dieldrin was the synthesis by BENICK and KORTE (5) of the bridged ketone structure which MATSUMURA *et al.* (6) proposed as their metabolite F. MATSUMURA *et al.* (7) incubated  $^{14}\text{C}$ -labelled endrin with 150 cultures of micro-organisms isolated from soils. Twenty-five appeared to be active in degrading endrin.

A number of pertinent studies had been made at the Institut für Ökologische Chemie, Schloss Birlinghoven. Six weeks after  $^{14}\text{C}$ -endrin treatment 32-47% of residues based on the applied radioactivity were found on and in tobacco plants. The residues consisted not only of endrin but also of a very hydrophilic substance (30% after 6 weeks). It was shown by radio-thin-layer chromatography that besides endrin there were 2 groups of degradation product in cotton plants, one group being only slightly more hydrophilic than endrin itself, the other one very hydrophilic. After foliar application to white cabbage, residues of  $\Delta$ -keto-endrin disappeared more slowly than those of endrin itself. Ten weeks after foliar application of  $^{14}\text{C}$ -isodrin to white cabbage, total residues amounted to 33% of the applied quantity. The main product in the plants was endrin; the main product on the leaves' surface was a very hydrophilic substance which so far had been unknown. Leaves and leaf surfaces contained about 20-30% of  $\Delta$ -keto-endrin. In contrast to the tests with white cabbage, 12 weeks after soil treatment as much as 40% of the residues in soil were isodrin; carrots and carrot leaves also still contained isodrin after this period. After foliar application of  $^{14}\text{C}$ -photodieldrin to white cabbage, residues disappeared more slowly than in corresponding tests with aldrin, dieldrin, isodrin, and endrin. Metabolite fractions consisted of a very hydrophilic main product and of at least two less hydrophilic by-products.

Observations on the animal metabolism of the cyclodiene insecticides suggested that microsomal enzyme systems in the liver must be responsible for their conversion to more hydrophilic metabolites. *In vitro* transformations by microsomal enzymes had now been amply demonstrated. MATTHEWS and MATSUMURA (8) found that dieldrin was converted by rat liver microsomes *in vitro* into a number of more hydrophilic materials. The *trans*-dihydroxy-dihydro aldrin and its glucuronide conjugate were minor products. The principal faecal dieldrin metabolite of rats and the principal rat urine metabolite were both major *in vitro* liver enzyme metabolites. BROOKS *et al.* (9, 10) had demonstrated epoxide hydrolase activity in rabbit and pig livers even for the refractory dieldrin. RICHARDSON, ROBINSON and BALDWIN (11) fed rats with  $^{14}\text{C}$ -labelled endrin, and confirmed the rapid excretion pattern reported by KLEIN *et al.* (12). BALDWIN *et al.* (13) had now found that the major faecal metabolite was a secondary alcohol formed by substituting a hydroxyl group for one of the hydrogens of the methano-bridge of endrin. Rat liver perfusion studies with endrin (14) confirmed that it was metabolized by enzymes of the liver. KORTE's laboratories had found that mammals metabolized  $\Delta$ -keto-endrin as quickly as endrin itself. HEDDE *et al.* (15) administered  $^{14}\text{C}$ -dieldrin to sheep and about 33% was excreted over a 6-day period with a little less than 50% of the excreted materials in the urine. Faeces were not examined.



The urine contained six metabolites, four extractable with hexane. FEIL *et al.* (16) identified one urine metabolite as the *trans*-6, 7-dihydroxy-dihydro aldrin, and one as a monohydroxy dieldrin in which one methano-bridge hydrogen was replaced with a hydroxyl. BALDWIN *et al.* (17) isolated a larger and purer sample of the principal dieldrin faeces metabolite of rats, which allowed a more accurate structure determination. This proved to be the same as the monohydroxy compound described by FEIL *et al.* with the methano-bridge of dieldrin hydroxylated. It was undoubtedly identical to the major faecal metabolite isolated by MATSUMURA. BALDWIN and ROBINSON (18) fed the photo-isomer of dieldrin to rats for 13 weeks. They found that a metabolite was stored in the tissues in small amounts. This metabolite was identified as the ketone which was the principal rat urine metabolite of dieldrin. DAILEY *et al.* (19) and KLEIN *et al.* (20) administered  $^{14}\text{C}$ -photo-dieldrin to male and female rats intraperitoneally and orally daily, five days a week, for 12 weeks. Analysis of the urine showed the principal metabolite (about 85% of the total) of male rat urine to be the ketone commonly called 'Klein's metabolite' in agreement with BALDWIN and ROBINSON. However, none of this ketone was detected in female rat urine. No photo-dieldrin was excreted in the urine of either. At least four metabolites were present in the urine of female rats, but had not been identified so far. The following observations had been made by KORTE's laboratories. After intravenous application of photo-dieldrin- $^{14}\text{C}$  to rats (70  $\mu\text{g/kg}$  body weight) the radioactivity was excreted only slowly (about 17% by male rats within 72 hours, about 15% by female rats within the same time). Ninety-five percent of the radioactivity found in faeces and urine was due to two metabolites in the ratio 2:1. The main product was very hydrophilic; the second metabolite was only slightly more hydrophilic than photo-dieldrin itself. After intravenous application of photo-dieldrin- $^{14}\text{C}$  to rabbits (115  $\mu\text{g/kg}$  body weight) excreta contained about 16% of the radioactivity only in the form of a very hydrophilic metabolite after 96 hours. KORTE and his coworkers had also studied the metabolism of dihydroxy-dihydro-aldrin. After intravenous or oral application, respectively, of this  $^{14}\text{C}$ -labelled metabolite to rabbits, only slight conversion was found. In rats, however, there was a higher conversion rate of this substance and about 10% of the radioactivity excreted in the faeces was due to hexachloro-tetrahydro-indane-1, 3-dicarboxylic acid. This result was the first example for the actual degradation of a compound of this class in mammals. On feeding  $^{14}\text{C}$ -heptachlor to rats and rabbits, KAUL *et al.* (21) found only heptachlor epoxide in the tissues. Twenty percent of the radioactivity in the urine and faeces was a hydrophilic metabolite which was chromatographically identical to the 1-hydroxy-heptachlor epoxide. Similar results were obtained for intravenous application of heptachlor epoxide. After injection of 1-hydroxy-heptachlor epoxide in male rats no further change occurred.

Photochemical transformations of the cyclodienes were important with respect to terminal residues on plants. MCGUIRE *et al.* (22) studied the photochemistry of heptachlor under various conditions. KORTE *et al.* (23, 24) reported photochemical transformations of many cyclodienes with and without sensitization by carbonyl compounds. Under conditions favourable to triplet formation good yields of bridged or 'caged' structures were obtained where such structures were possible. An important experiment isomerizing exo-endo-tetracyclo-(6.2.1.1<sub>3,6</sub>.0<sup>2,7</sup>) dodecene-4 in hexadeutero acetone proved that the rearrangement to form bridged molecules did not occur through a nonclassical homo-allyl radical as a transition state. BROWN *et al.* (25) irradiated acetone solutions of chlordane and several of its pure components. In those cases in which a double bond was present in the 1,2 position, the

cage structures were obtained. At this time information did not seem to be available relative to the significance of the various photochemical products as terminal residues.

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### Appendix 6: Other Organochlorine Compounds

*Toxaphene.* There continued to be a dearth of information on the nature of the terminal residues of toxaphene. Since toxaphene was such a complex mixture of a large number of related compounds, it was only natural that



the original and terminal residues were also complex. The early literature which might be useful in judging the general nature of possible terminal residue consisted of total residue and biological activity. CARTER, NELSON and GERSDORFF (1) showed that weathered residues of toxaphene extracted from alfalfa (and determined by total chlorine content) produced essentially the same fly kill as did the same amount of a standard sample of toxaphene. Likewise, IR and fly-toxicity tests made on the organic chlorine material from fat from a toxaphene-treated steer, gave the same IR picture and kill as did an equal amount of toxaphene. IHDE and TAFT (2) showed that peak insecticidal activity of toxaphene occurred at a chlorine content of 67-69% when tested against both houseflies and southern armyworms. The activity curves for both insects essentially superimposed and there was a very rapid decline in activity above and below 67-69% chlorination. This information coupled with that of CARTER *et al.* indicated that the general nature of the residue was probably similar to the original. This, of course, was not specifically true. KLEIN and LINK (3) showed in a field weathering study of toxaphene that there was a change in peak pattern. Their gas chromatographic system gave 12 easily recognized peaks. The most striking change was the rapid loss of total residue; at 14 days only 1% of the original remained. In that 1%, peaks 1 and 7 had almost disappeared. At 21 days, peaks 1, 2, 5, 7, 10, and 11 were almost lost. Peaks 6, 8, and 9 were the most persistent. There was a new relatively small peak formed between peaks 1 and 2 and another smaller one between 2 and 3. These were not identified. The data from these experiments did not show a striking appearance of new significant and persistent halogenated residues as the overall residue diminished.

*Chloropropylate and Chlorobenzilate.* The absorption, translocation, and degradation of  $^{14}\text{C}$ -chloropropylate in bean seedlings were studied. Although absorption and limited translocation could be demonstrated in certain instances, no degradation was observed. Rats fed  $^{14}\text{C}$ -chloropropylate in a single dose simulating a dietary intake of 35 ppm were found to eliminate three radioactive components in the urine and faeces. These maximized at 9 hours in the urine and 16 hours in the faeces. No respired radioactivity could be demonstrated. Significant amounts of radioactivity were recovered in kidney, liver, heart, stomach contents, and gastrointestinal tract (4).

Chlorobenzilate, chloropropylate, and GS-19851 (isopropyl 4, 4'-dibromobenzilate) labelled with  $^{14}\text{C}$  in both aliphatic carbon atoms of the benzoic acid moiety were applied to leaves of soybean plants grown in greenhouse pots. Each leaflet was treated with 25,000 cpm of acaricide in 10 ml of 95% ethanol with a microsyringe. Specimens were analyzed after 0, 4, 8, 12, and 16 days. Only limited transportation of the acaricides to other tissues of the plant was observed. Recovered radioactivity on day 0 was 84.7% (chlorobenzilate), 94.8% (GS-19851), and 96.5% (chloropropylate). On day 16 these values were 10.5%, 17.7%, and 10.3%, respectively. Autoradiography revealed that the major component (greater than 95%) was the parent compound in all cases (5).

At least 95% of the total residual radioactivity in soil treated with  $^{14}\text{C}$ -isopropyl 4,4'-dibromobenzilate and field-weathered for 14 months was accounted for as the parent compound (6).

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### Appendix 7: Chemical Nature of Terminal Residues of Carbaryl and Other Carbamates

**Carbaryl.** The urinary metabolites of carbaryl in hens were studied by PAULSON *et al.* (1). These were identified as 1-naphthol, 1-naphthyl glucuronide, and sulfate esters of 1-naphthol, 4-hydroxycarbaryl and 5-hydroxycarbaryl sulfates, and other conjugates. Other conjugates were formed with 1,5-naphthalenediol, 5,6-dihydroxycarbaryl, and 1,5,6-trihydroxynaphthalene. The structure of the animal metabolite proposed by LEELING and CASIDA (2) to be 5,6-dihydro-5,6-dihydroxy-1-naphthyl *N*-methylcarbamate had been confirmed (3). SULLIVAN *et al.* (4) had found this glucuronide in rat urine. BARON (5) had determined that a portion of the carbonyl carbon was converted to lactose in milk when fed to a dairy cow.

**Aldicarb.** Cotton plants grown in soil or liquid culture were treated (soil or water) with 2-methyl-2-(methylthio)propionaldehyde *O*-(methylcarbamoyl) oxime (TEMIK, aldicarb), yielding 70-80% of water-soluble metabolites. In addition to conjugates of 2-methyl-2-(methylsulfinyl)propanol and 2-methyl-2-(methylsulfonyl)propanol were found 2-methyl-2-(methylsulfinyl)propionaldehyde oxime, 2-methyl-2-(methylsulfinyl)propionamide, 2-methyl-2-(methylsulfinyl)propionic acid, and 2-methyl-2-(methylsulfonyl)propionic acid (6). Of aldicarb residues in milk, 4% was aldicarb sulfoxide, 15% was aldicarb sulfone and the remainder hydrolytic products. Approximately 1% of the oral dose was excreted in milk (7).

**Carbofuran.** Alfalfa treated with carbofuran (FURADAN) gave glycosides of 3-hydroxycarbofuran (37%), 2,3-dihydro-3,7-dihydroxy-2,2-dimethylbenzofuran (18%), and 2,3-dihydro-7-hydroxy-2,2-dimethyl-3-oxobenzofuran (20%). These glycosides, fed to rats, were converted to the following urinary metabolites: glucuronides and sulfates from the 7-hydroxyglycoside (60%) and from the 3,7-dihydroxyglycoside (22%). A small amount (3%) of the glucuronide of 3-hydroxycarbofuran was recovered. When carbofuran was fed to rats 34% of glucuronides and sulfates of the 7-hydroxy metabolite and 30% of the 3,7-dihydroxy metabolite were found. A small amount (7%) of 3-hydroxycarbofuranyl glucuronide was also present in urine (8). A review of carbofuran metabolism had recently appeared (9).

**Formetanate.** Orange seedlings treated with formetanate (*m*-[(dimethylamino)methylene]aminophenyl *N*-methylcarbamate) gave the *m*-methylamino, *m*-formanido, and *m*-amino metabolites and *m*-aminophenol. A minor metabolite was *m*-dimethylaminomethyleneiminophenol (10). The major metabolic pathway in rats was the *m*-formanido carbamate (and glucuronide) to *m*-formamido phenol, then to *m*-aminophenol and *m*-acetamidophenol. A minor metabolite was the monomethylamino carbamate (and glucuronide). Unidentified water-soluble metabolites (12-18%) were also found (11).

**LANDRIN.** LANDRIN, a mixture of 2,3,5- and 3,4,5-trimethylphenyl *N*-methylcarbamates, was applied as the pure compounds to plants both topically and by stem injection. The 2,3,5-compound was converted to con-

jugates of the *N*-hydroxy and 3-hydroxymethyl metabolites and to the 5-carboxy metabolite. The 3,4,5-isomer gave conjugates of the *N*-hydroxy, 3-hydroxymethyl, and 4-hydroxymethyl metabolites. In mice the 3,4,5-isomer gave urinary conjugated metabolites of trimethylphenol, the 3- and 4-hydroxymethyl carbamates, the corresponding phenols, and of the 3- and 4-carboxyphenols. The 3-carboxycarbamate was identified and the 4-carboxycarbamate was probable. The 2,3,5-isomer in mice gave the 3-hydroxymethyl carbamate and probably the 3- and 5-carboxycarbamates (12).

**MEOBAL.** 3,4-Dimethylphenyl *N*-methylcarbamate, fed to rats, was converted to the major urinary metabolites 3-methyl-4-carboxyphenyl *N*-methylcarbamate and 3,4-dimethylphenyl *N*-(hydroxymethyl)carbamate. Also found (free and conjugated) were 3-methyl-4-carboxyphenol and 3-(hydroxymethyl)-4-methylphenyl *N*-methylcarbamate (13).

**MOBAM.** Benzo(b)thien-4-yl *N*-methylcarbamate was fed to lactating cows and goats. The carbonyl carbon was recovered both as carbon dioxide (75%) and in urine (13%) and the *N*-methyl carbon was also found as carbon dioxide (38%) and in urine (13%). The major (95%) metabolite in milk was 4-benzothienyl sulfate-1-oxide; a minor (1-2%) metabolite was 4-benzothienyl sulfate (14).

**Sirmate.** 3,4-Dichlorobenzyl *N*-methylcarbamate in plants was converted to glucosides (primarily) of the 3,4-dichlorosubstituted benzyl alcohol, 2-hydroxybenzyl alcohol, benzoic acid, benzyl carbamate, and benzyl hydroxymethylcarbamate (15).

**ZECTRAN.** A ZECTRAN derivative, 4-dimethylamino-3,5-xylyl-*N*-acetyl-*N*-methylcarbamate, fed to rats, gave 4-dimethyl-3,5-xyleneol<sup>†</sup> glucuronide and the free phenol. Only a small amount of the *N*-methyl carbon was converted to carbon dioxide (16).

**Reviews.** Reviews of carbamate metabolism had recently been published (17-21).

**Comment.** Separated from the main body of the report were literature citations on chlorpropham, an *N*-phenyl carbamate. Because of its lack of structural similarity to the methyl carbamates reported above, it would not appear in future reviews unless specifically requested. Isopropyl *m*-chloroanilate on plants gave water-soluble metabolites which, on hydrolysis, were converted to *m*-chloroaniline (22). The feeding of *m*-chloroaniline to rats gave sulfates and glucuronides of 2-acetamido-4-chlorophenol and 4-acetamido-2-chlorophenol (23).

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## Appendix 8: Organophosphorus Compounds

**Diazinon.** *O,O*-Diethyl *O*-(2-isopropyl-4-methyl-6-pyrimidinyl) phosphorothioate (diazinon), administered orally to rats, was recovered as urinary (69-80%) and faecal (18-25%) metabolites. The major urinary metabolites were 2-isopropyl-4-methyl-6-pyrimidone (23%), 2-(1-hydroxyisopropyl)-4-methyl-6-pyrimidone (21-23%), 2-(2-hydroxyisopropyl)-4-methyl-6-pyrimidone (9%), and 15-27% of unidentified polar metabolites (1). Field-sprayed kale residues contained, in addition to parent compound and 2-isopropyl-4-methyl-6-pyrimidone, small amounts of diazoxon and hydroxydiazinon-*O,O*-diethyl *O*-[2-(2'-hydroxy-2'-propyl)-4-methyl-6-pyrimidinyl] phosphorothioate (2). Diazinon absorbed by alfalfa after soil treatment remained constant from 9-15 days post treatment with no measurable metabolites (3). **Dimethoate.** Metabolites isolated from rat urine include dimethoate acid, dimethyl phosphorodithioic acid, dimethyl phosphorothioic acid, mono-methyl phosphoric acid, and phosphorothioic acid. The *oxycarboxy* metabolite was not detected. The *N*-methyl carbon was converted to formate, carbon dioxide, and a glucuronic acid not containing sulfur or phosphorus (4). Recent work had identified four metabolites from rat urine, namely des-*N*-methyl dimethoate, *N*-hydroxymethyl dimethoate and the corresponding derivatives of the oxygen analogue (5). However, these metabolites were transitory in that no dimethoate organoextractable metabolites were detected in rat urine after the first 24 hours following oral administration.

**Parathion and Methyl Parathion.** Metabolites in rat urine from orally administered parathion included *O,O*-diethyl phosphorothioic acid (40-50%), *O,O*-diethyl phosphoric acid (20-30%), desethyl paraoxon (10-20%), inorganic sulfate (50%), and an unidentified highly polar metabolite (6). *p*-Nitrophenol was a major metabolite in trout and desethyl parathion a minor one (7). The metabolic process was identical with methyl parathion. In rats with carbon tetrachloride-damaged livers injected with parathion there was less absorption of the insecticide and slower conversion to paraoxon



than with healthy rats (8). When methyl parathion was administered orally to pregnant rats, both the parent compound and methyl paraoxon were found in the faetuses (9).

**Dioxathion.** Several early radiophosphorus studies in animals revealed only diethyl phosphorodithioic, phosphorothioic, and phosphoric acids (10-12). Unidentified cholinesterase inhibitors were found in bean, cotton, and tomato plants (13).

**Coumaphos.** There appeared to be little difference in coumaphos metabolism in the rat whether the insecticide was administered orally or dermally. About 7% of urinary  $^{32}\text{P}$ -activity was chloroform soluble while 21% was found in the chloroform fraction from faeces. In urine there was 1-2 times as much oxygen analogue as parent compound; the two were about equal in faeces. It was speculated that an unknown more polar metabolite was desethyl coumaphos. Ethyl and diethyl phosphorodithioic acids were found in urine (14).

**Phosphamidon.** Nine urinary (rat and goat) and milk (goat) metabolites were isolated. Those identified were *N*-desethyl (not in milk) and *N,N*-bis(desethyl) phosphamidon, deschlorophosphamidonamide,  $\alpha$ -chloro-*N,N*-diethylacetoacetamide, and  $\alpha$ -chloroacetoacetamide (15). More recently, metabolic studies had yielded evidence that the other metabolites were probably the vinyl hydroxyl analogues of phosphamidon, and *N*-desethyl derivatives as well as the hydroxyethyl derivative (16). Positive identification was awaited from direct chemical synthesis which had proved difficult.

**Reviews.** Several reviews of the metabolism of organophosphorus insecticides had appeared recently (17-20).

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## Appendix 9: Terminal Residues of Fumigants

Samples of cereal grain (wheat, maize, rice, rye, buckwheat, granifero, milo, oats, and barley) from shipments from all parts of the world arriving in the Netherlands during 1964-1966 were analyzed by sensitive gas chromatographic techniques for the following fumigants:  $\text{CCl}_4$ , EDC (ethylene dichloride), EDB (ethylene dibromide), MB (methyl bromide), total bromides (including organic and inorganic, from natural sources and from fumigants), EO (ethylene oxide), and  $\text{PH}_3$  (1).  $\text{CCl}_4$  was found in 41 % of the samples and it was the only fumigant detected in numerous samples. In view of the low EDB and MB residue figures, it could be concluded that very little unchanged fumigant was retained and that most of the total bromides in cereals was found in the inorganic form.  $\text{PH}_3$  was detected in about 11 % of the samples investigated, only once above 0.1 ppm. The bromide (presumably inorganic) content of maize, pulses and four types of nut arriving at British ports were determined by THOMPSON *et al.* (2) during 1963-1968 using an analytical sensitivity of about 1 ppm. In maize, which had been fumigated with methyl bromide in ships holds before export, 75 % of the 155 samples examined contained less than 50 ppm of bromide.

MALONE (3) studied methods of analysis of grains for multiple residues of organic fumigants. Residues in ground grain were higher than in whole grain with  $\text{CCl}_4$  and  $\text{CS}_2$  which indicated extraction difficulties with whole grain.

SCUDAMORE *et al.* (4) had published work concerning the retention of methyl bromide in a range of commodities under a variety of temperatures, exposure times, and moisture contents of foods as previously reported (5).

ALUMOT *et al.* (6) fumigated whole-grain wheat, barley, corn, and sorghum with a mixture containing 5 % of  $\text{CCl}_4$ , 26 % of  $\text{CS}_2$ , 32 % of  $\text{CHCl}_3$ , and 36 % of  $\text{CHCl}=\text{CCl}_2$  (trichloroethylene) by volume, at two controlled temperatures (17 and 30°C). Desorption of the unchanged fumigants was studied over a period of 66 days of aeration at which time all fumigants were below 23 ppm for all of the grain species at 30°C. At 17°C a much more rapid desorption took place to less than 7 ppm by 20 days. The phenomenon of more rapid desorption of fumigants from grain at the lower temperature appeared to have been undetected by previous researchers.

Grains, pulses, tobacco, and feeds often of unknown bromide residue history were fumigated with high concentrations of methyl bromide, 40 to 200 g/M<sup>3</sup> (=2.5 to 12.5 lb/1000 cu. ft.) by SEEFELD *et al.* (7). Methyl bromide residues reported were those estimated by differences between inorganic bromide residue values taken at various intervals after fumigation and aeration. The analytical method, while dealing mainly with inorganic bromides, was not specific for inorganic bromide. Excessively high bromide residues were found in beans and peanuts.

WIT *et al.* (8) studied the disappearance of  $\text{CCl}_4$ , EDC, and EDB from fumigated wheat during storage and processing to bread. This information and other similar published data were summarized by KENAGA (5). A post-fumigation aeration period of 2-12 weeks decreased the residues drastically; however, appreciable amounts remained. Following washing and cleaning, the grain was milled into a commercially prepared bread flour. The residues from washed and cleaned wheat were reduced considerably in the milling process for making flour as follows:  $\text{CCl}_4$ , 87-91 %; EDB, 63-73 %; EDC,



76-86%. Usually, slightly more residues occurred in the bran and shorts than in the flour. The residues in baked bread made from flour and whole meal flour underwent drastic reductions and in all cases were below 0.25 ppm. It would appear that the fumigants reported here ( $\text{CS}_2$ ,  $\text{CCl}_4$ , EDC, and EDB) when used for grain fumigation would result in residues of unchanged fumigant of less than 1 ppm when the treated grain was prepared for human consumption by cooking or baking.

GORDIS (9) studied  $^{14}\text{C}$ - and  $^{36}\text{Cl}$ -carbon tetrachloride injections in rats and found most of the radioactivity appearing rapidly in phospholipids. Evidence strongly suggested the formation of branched long-chain chlorinated fatty acids, probably containing the trichloromethyl side chain, due to trichloromethyl free radical formation and reaction. Chloroform was also a known metabolite. FOWLER (10) analyzed fat and liver tissues of rabbits by means of gas-liquid chromatography with electron capture detection. The trichloromethyl radical formation from  $\text{CCl}_4$  apparently accounted for chloroform found in the liver and very small quantities (16.5 ppb) of the dimer,  $\text{Cl}_3\text{C.CCl}_3$ , found in fat tissues.

HEUSER *et al.* (11) reported the formation of EBH (ethylene bromohydrin) as well as ECH (ethylene chlorohydrin) in flour and wheat treated with EO (ethylene oxide) [see KENAGA (12)]. This was the result of reaction of EO with inorganic chlorides and bromides in the presence of moisture. Nuts fumigated with excessively heavy dosages of methyl bromide and then roasted might have an off flavour caused by the production of a few ppm of dimethyl sulfide. Additional dimethyl sulfide over the natural trace amounts found in nuts was formed by decomposition of the methyl bromide-methionone complex in fumigated nuts when heated according to BILLS *et al.* (13).

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### Appendix 10: Terminal Rethrin and Synergist Residues

The study on the metabolism of the methylenedioxyphenyl synergists had been completed (1). There appeared to be a distinct difference between the



metabolism of certain methylenedioxyphenyl compounds, the major metabolic pathway for piperonyl butoxide, sulfoxide, dihydrosafrole and myristicin in mice, after oral administration, involved cleavage of the methylenedioxyphenyl moiety and expiration of the methylene carbon as carbon dioxide.

In contrast, oxidation or conjugation (or both) of the side chain was the major metabolic pathway for Tropital, piperonal, piperonal alcohol, and piperonylic acid.

A report on the metabolism of pyrethrins II, analogues of pyrethrins I, allethrin, dimethrin, and phthalthrin by the house fly enzyme, by YAMAMOTO and CASIDA (2), indicated that the metabolism of pyrethrum and the synergists in insects was somewhat analogous to that of warm-blooded animals.

Recent work on the photodecomposition of pyrethrins I, allethrin, phthalthrin, and dimethrin by CHEN and CASIDA (3) showed that these compounds decomposed readily when exposed to sunlight and air as thin films on glass, the rate of decomposition decreasing in the order: pyrethrins I, allethrin, phthalthrin, and dimethrin.

Unpublished data received on terminal residues of pyrethrins and synergists by HEAD (4) showed that piperonyl butoxide stabilized pyrethrins exposed to sunlight and air. This work indicated that the pyrethrins on wheat showed much greater stability than in the thin film exposed on the untreated controls. Pyrethrins II components tended to be more stable than the pyrethrins I components and the cinerins were more stable than the pyrethrins. Although the extract from the wheat was typical of the degraded material, both the pyrethrins I and pyrethrins II were still clearly present. It was probable, therefore, that when the wheat was sprayed with pyrethrins, part of the active constituents were absorbed and protected while the material on the surface suffered rapid degradation. Electron capture-gas chromatographic tracings showed that the degradation of pyrethrins on grain was typical of the degradation of pyrethrin films on glass. A study of the acute oral LD50 of these two materials, *i.e.*, the original extract versus the degraded material, showed 7.5 g per kg of body weight of the LD50 from the original extract and 8 g per kg of the LD50 for the degraded material.

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### Appendix II: Effects of Processing on Residues of Organochlorine Pesticides in Food

The widespread agricultural usage of pesticides ensured that these compounds would be present to some degree in the majority of foods. The extent of man's exposure to pesticides was indicated by analysis of raw food commodities and of processed and prepared food. The collation of this data provided information on adventitious removal of residues. Some excellent reviews on the effects of processing on pesticide residues in foods had recently been published by STOBWASSER *et al.* (1), STREET (2), LISKA and STADELMAN (3), and FARROW *et al.* (4). The present review was intended as an up-to-date supplement to those mentioned.

BALDWIN *et al.* (5) studied the effects of preparation on residue levels of DDT and its derivatives in apples which contained total residues of approxi-

mately 3.5 ppm. Preparative treatments included washing, paring and coring, baking, boiling, broiling, electronic cooking, and pressure cooking. Washing appeared to have little effect on the residue level. Washing combined with paring and cooking, however, removed approximately 50% of the residues. POWELL *et al.* (6) studied the effects of commercial processing on tomatoes containing field residues of aldrin and its metabolite dieldrin at approximately 0.1-ppm level. The commercial processing removed approximately 80% of the residues present on the raw produce. Residue reduction occurred during the washing and peeling operations.

Several researchers including LI *et al.* (7) had reported that most organochlorine residues were stable to normal processing and storage procedures to which dairy products were subjected. However, BILLS and SLOAN (8) developed a laboratory-scale procedure which the authors thought might find use for decontamination of milk when expanded to an industrial scale. These researchers successfully removed 95-99% of organochlorine residues from milk fat by molecular distillation. LI *et al.* (7) studied the fate of several organochlorine pesticides during processing of milk into dairy products. Lactating dairy cows were fed dieldrin; a mixture of heptachlor, DDT, and lindane; toxaphene, chlordane, endosulfan (Thiodan); and dicofol (Kelthane). Residue content of the dairy products and byproducts (on a fat basis) was very stable for ordinary processing operations and remained essentially unchanged, even in the dairy products that were stored for 3-6 months. The exceptions were dieldrin, lindane, and chlordane which showed 27, 34, and 11% decrease, respectively, for spray-dried products.

SMITH *et al.* (9) reported on the effects of simulated commercial processing of cottonseed oil on residues of endrin, DDE, aldrin, dieldrin, heptachlor, and heptachlor epoxide at 1.0 ppm of each and DDT at 21 ppm. Results indicated all pesticides were removed by deodorization to below the 0.03-ppm limits of detection. MOUNTS *et al.* (10) conducted similar studies with endrin residues in soybean oil and reported that moderate temperature deodorization conditions (210°C) were only partially effective in removing endrin. However, high temperature conditions of deodorization at 250°C and 4-6 mm of mercury for 1.5-2 hours removed about 96% of the endrin residues. The experimental results reported by SAHA *et al.* (11) on the effects of commercial processing on <sup>14</sup>C-labelled residues of lindane and DDT in another vegetable oil, rapeseed oil, also confirmed the earlier findings of SMITH *et al.* (9) and MOUNTS *et al.* (10). Alkali refining and bleaching operations had little or no effect on the residue levels; however, the final step, deodorization, removed 95-99% of the residues. BEVENUE and YEO (12) determined the effect of cooking on chlordane residues in wheat flour and rice. Chlordane residues removed from the wheat flour (cookies) varied from 33 to 73% with a mean of 53%. The washing process on rice removed about 6% of the residue and boiling water removed an additional 58-79%. Combined washing and boiling processes removed an average of 73% of the chlordane residue from rice. HALLAB (13) reported an *in vitro* detoxification study of oysters fortified with 0.1-2 ppm of endrin, dieldrin, *p,p'*-DDT or toxaphene. Contaminated samples were irradiated at different levels with <sup>60</sup>Co, X-rays, and ultraviolet rays. The results showed that X-ray irradiation was ineffective in degrading the pesticide molecule. <sup>60</sup>Co-irradiation showed a highly significant effect in degrading the pesticides. Ultraviolet light also caused significant degradation of endrin and dieldrin. LISKA *et al.* (14) reported that cooking of hens containing residues of DDT, lindane, or dieldrin for 3 hours at 121°C rendered essentially all the insecticides from the body tissue of the hen. McCASKEY *et al.* (15) extended this study to include methoxychlor, chlordane, Kelthane, telodrin, and ovex.



Processing procedures for fruits and vegetables had been proved effective for substantial reduction of organochlorine residues. Pesticide residues in dairy products, however, were generally not removed by normal processing procedures. A method was available, for deliberate reduction of residue should it become necessary. The commercial processing of edible vegetable oils by deodorization, using the proper experimental conditions, was very effective in removing organochlorine pesticide residues.

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## COMMISSION ON PESTICIDE RESIDUE ANALYSIS (VI.5.2)

**Ehrbach/Rheingau, 16-17 September 1970**

*Present:* Dr. R. A. E. GALLEY (Chairman), Mr. W. BURNS BROWN, Mr. J. W. COOK, Mr. K. E. ELGAR, Dr. H. FREHSE, Dr. H. HURTIG, Dr. P. E. KOIVISTONEN, Dr. CH. RESNICK, Prof. G. WIDMARK, Dr. D. C. ABBOTT (Secretary); and by invitation Dr. E. E. TURTLE (FAO), Dr. E. POULSEN (WHO), Dr. A. KRUYSE (CCPR), Dr. H. MARCHANT (FAO-IAEA), Dr. S. DORMAL-VAN DEN BRUEL (CEE), Dr. F. GEISS (CEE), Dr. V. BATORA (Czechoslovakia), Dr. P. EICHLER (C.H. Boehringer Sohn), Dr. A. MULLER (C.H. Boehringer Sohn), Dr. B. J. DE LA GRAVIERE (Minoc, SARL), and Dr. K. FUKUNAGA, Dr. K. R. HILL, Mr. E. E. KENAGA, Dr. J. B. MOORE, Dr. P. B. POLEN, Dr. P. E. PORTER (all from Commission VI.5.1). Apologies for absence were received from Dr. K. A. MCCULLY.

1. Dr. GALLEY welcomed Members and visitors to the meeting and moved the adoption of the agenda; this was agreed.



2. The Chairman referred to the Minutes of the Fourth Meeting, held on 3-5th July 1969 which, together with Appendices, had been circulated previously; with minor corrections, which were indicated, these were agreed.
3. Arising from the Minutes the following matters were referred to:
- (a) The Chairman reported that the proceedings of the Fourth Meeting had been published in *Comptes Rendus XXV Conference* (p. 196) and a summary had been published in *J. Assoc. Offic. Anal. Chem.* **53**, 1004 (1970).
  - (b) It was reported that the recommendations relating to methods of analysis for organochlorine pesticides [Minute 4(a)] had been received by the FAO-WHO Joint Meeting, approved, and passed on to Codex.
  - (c) It was reported that these recommendations had also been sent to the IUPAC Oils and Fats Section [Minute 4(c)]; it was known that a second collaborative study had been carried out by that Section but no results were available.
  - (d) Dr. FREHSE confirmed that his report on organophosphorus pesticide residue analysis would be published soon [Minute 5(b)].
  - (e) Dr. ABBOTT indicated that the paper on the identification of organomercurials [Minute 9(b)] had now been published in *J. Chromatog.* **44**, 284 (1970).
  - (f) It was confirmed that progress was being made with the FAO-IAEA-WHO book on *Mercury in the Environment* [Minute 9(c)] but no publication date could yet be given.

#### 4. International Liaison

(a) *FAO-WHO*. The report of the 1969 FAO-WHO Joint Meeting was discussed in so far as it affected the Residue Analysis Commission. Indications had been made that regulatory methods for residues of a number of compounds were desired and certain members agreed to undertake to watch for suitable procedures for the determination of residues:

Dr. FREHSE	— fenitrothion, formothion, thiometon
Mr. ELGAR	— hexachlorobenzene, quintozene
Dr. RESNICK	— ethoxyquin
Mr. COOK	— captafol, captan, folpet
Dr. MOORE	— pyrethrins and piperonyl butoxide
Dr. ABBOTT	— binapacryl, dinocap
Dr. KOIVISTOINEN	— dichlofluanid

Dr. TURTLE described the way in which liaison between IUPAC and FAO was effected and agreed that information on methods for the compounds referred to above would be welcomed by FAO.

(b) *Codex*. Dr. KRUYSSSE briefly referred to liaison between the IUPAC Pesticides Section and Codex and its Committee on Pesticide Residues.

(c) *FAO-IAEA*. The programme of the Joint FAO-IAEA Division, which was designed to exploit isotope tracer techniques for studying pesticide residue and pollution problems, was described by Dr. MARCHANT. The activities consisted of the collection and dissemination of information, the coordination of research, and training activities with particular reference to the interests, needs and problems of developing countries. The nature of the programme was discussed objectively with special reference to the applicability of radio-metric techniques in the study of pesticide residue analytical procedures.

(d) *OECD*. Dr. RESNICK introduced a statement summarizing OECD activities in the field of pesticides and a report on the second *ad-hoc* technical conference on *Unintended Occurrence of Pesticides in the Environment* which took place in the Netherlands in October 1969. Prof. WIDMARK had attended

this conference as representative of the IUPAC Pesticides Section and reported on the meeting. A request to the Pesticides Section concerning analytical methods for hydrophilic metabolites of organochlorine pesticides was discussed and it was agreed that in the present poor state of knowledge of the nature of these compounds, it was not practicable to devise analytical methods. Arrangements were made to provide OECD with information relating to these compounds which had been discussed by the IUPAC Terminal Residues Commission (VI.5.1). Prof. WIDMARK also asked whether other environmental pollutants such as polyaromatic hydrocarbons, organo-lead compounds, optical whites, organofluorides or inorganic salts such as cadmium compounds, had caused any difficulties in international trade. Dr. KRUYSE thought not, but when the Codex had suggested tolerances for arsenic, lead, and bromide ion, they could only be applied irrespective of the source of the contamination; a similar situation might occur for other contaminants present in the environment. Dr. HURTIG pointed out that the FAO-WHO Expert Committee on Food Additives had an interest in unintentional as well as intentional *additives* and that there was also an allied Codex Committee on Food Additives.

(e) *CEE*. Dr. DORMAL-VAN DEN BRUEL described the organization and procedures of the CEE in the field of pesticide tolerances and analytical methods. Tolerances were established within the CEE for similar reasons to those advanced by Codex and steps were taken to try to harmonize legislation between the member countries. The need for suitable and adequate sampling procedures was stressed and met with general agreement. Liaison with IUPAC was seen as a useful contribution to the development of unified methodology within the CEE member countries. Information was sought regarding suitable methods for residues of a number of pesticides including amitrole, aramite, atrazine, barban, binapacryl, diallate, TEPP, and toxaphene.

(f) *Czechoslovakia*. Dr. BATORA described some work in progress in Czechoslovakia relating to pesticide residue analysis with special reference to methods for organophosphorus compounds such as fenitrothion and thiometon. The need for standard samples of some metabolites and problems caused by the presence of impurities in technical products were stressed. Methods for the identification of organophosphorus compounds, including enzymatic procedures on paper or thin-layer chromatograms were discussed, together with interferences due to coextracted materials.

## 5. Organochlorine Compounds

(a) Mr. COOK introduced his report (Appendix 1) on multiresidue methods for organochlorine pesticides; few modifications affecting previously recommended methods had been seen during the year. Discussions centred largely on the problems raised by the presence of polychlorobiphenyls (PCB) and their quantitative evaluation. The way in which analytical results should be expressed was also considered, with special reference to fish and similar animal products. It was generally agreed that in view of analytical problems associated with some samples, the expression of analytical results on a 'fat basis' was not advisable. The meeting recommended that the position regarding tolerances expressed in this way should be further examined by the relevant authorities. It was agreed that information on methods concerning PCB should be passed to Mr. COOK, who agreed to continue to survey this field.

(b) Dr. FUKUNAGA presented a prepublication report on a gas chromatographic procedure for the separation of hexachlorobenzene from BHC



isomers. Data obtained in Japan on residues of some organochlorine pesticides in rice grain and straw, tomatoes, milk, fish, air, and rain-, sea-, river- and drinking-water were also presented. Discussion on units for expression of results followed this paper; terms of the type *mg per kg*, *ng/kg*, or *mg/l*, were to be preferred to *ppm*, *ppb*, or *ppt*, to avoid possible confusion.

## 6. Organophosphorus Compounds

(a) Mr. COOK introduced a report (Appendix 2) on multiresidue methods for organophosphorus pesticides. Discussion ranged over the virtues of separate or combined schemes of analysis for organochlorine and organophosphorus compounds. It was agreed that there was need and room for both types of procedure. The use of thin-layer chromatography as a reproducible tool for identification and quantitation was also discussed. Following these discussions the three recommendations contained in the report were adopted for transmission to the FAO-WHO Joint Meeting. Mr. COOK agreed to continue to collate information on this subject.

(b) Dr. FREHSE presented a revised version of his report to the previous meeting of the Commission which contained additional matter relating to the proposal that *questionnaires* should be prepared with a view to obtaining an orderly presentation of multiresidue methodology. This report would shortly be published in *Pflanzenschutz-Nachrichten Bayer*. Comments received from Members were discussed and it was agreed that the questionnaires could provide a useful guide to ensure that published reports contained all necessary data. Further comments and completed questionnaires would be sent to Dr. FREHSE who agreed to prepare a revised version in the light of the discussion and to collate information received for presentation at the next meeting. The following order of priority was suggested:

- (i) Multi-extraction and cleanup procedures including data on recoveries.
- (ii) Multi-detection systems for compounds which were subjected to item (i).
- (iii) Multi-detection systems which were evaluated independently of preceding extraction and/or cleanup (*i.e.*, with solutions of pure compounds).

Dr. FREHSE also introduced a report dealing with recent developments in the field of organophosphorus residue analysis. This included details of methods for the simultaneous determination of multiple residues, determination of residues of single pesticides, the state of development of methods within the AOAC [K. A. McCULLY, *J. Assoc. Offic. Anal. Chem.* **53**, 363 (1970)] and methods for the determination of hydrolytic products of organophosphorus compounds. This report would also be published in *Pflanzenschutz-Nachrichten Bayer*.

(c) Dr. HILL presented a prepublication paper (M. C. BOWAN, M. BEROZA and K. R. HILL, *J. Assoc. Offic. Anal. Chem.* in press) which gave chromatograms of foods for multicomponent residue determination of pesticides containing phosphorus and/or sulphur by gas-liquid chromatography with flame photometric detection. The paper provided chromatograms of extracts of 39 typical foods and food products obtained with two stationary phases. The general idea being that peaks of pesticide residues would be visible on a chromatogram of the food when little or no background interference existed in the vicinity of their retention times. If the chromatograms of the food extracts indicated that interference was to be expected, additional cleanup or use of another stationary phase might be required. Representative foods were chosen from the types listed by FAO-WHO to include as broad a variety as possible. An effort was made to extend the applicability of the data to inter-



national use by including pesticides considered by the FAO-WHO Joint Meeting.

(d) Dr. BATORA introduced an account of some preliminary work on the gas chromatography of multiple organophosphorus insecticides which had been presented at the IIIrd Analytical Conference in Budapest in August 1970. The hydrophilic metabolites of the sulphoxide type were modified prior to gas chromatography by reduction with titanium(III) chloride to the corresponding parent compounds. Work on this procedure was continuing.

(e) Mr. ELGAR reported that the method for dichlorvos residues referred to at previous meetings would shortly be published [K. E. ELGAR, R. G. MARLOW and B. L. MATHEWS, *Analyst* **95**, 875 (1970)].

## **7. Fumigants**

Mr. BURNS BROWN presented his report on analytical methods for fumigant residues (Appendix 3). This dealt with multiresidue methods, methyl bromide residues, inorganic bromide, residues from use of ethylene oxide, and phosphine. Sensitivity for most of the pesticide-commodity combinations was in the range of 0.1 to 1 mg/kg. Dr. TURTLE reminded the meeting that fumigants were to be reviewed by the Joint Meeting in 1971. Difficulties involved in trying to arrange for collaborative study of the proposed methods were discussed fully. The use of radioactive labelling to observe extraction rates and extents of absorption was also discussed. Mr. BURNS BROWN invited offers of assistance in checking the methods and agreed to continue to review fumigant residue analysis.

## **8. Organomercurials**

Prof. WIDMARK commented briefly on the present position and hoped to present a full report at next year's meeting. The environmental problem of the presence of mercury was discussed and Dr. FUKUNAGA introduced a publication (T. YAMADA and K. FUKUNAGA, *Bull. Nat. Inst. Agric. Sci. Tokyo*, 1970, March, Series C, No. 24) on studies of organomercurials in plants which contained details of a gas chromatographic procedure for fruits, vegetables, and soils. Dr. TURTLE stated that organomercurials were due to be reviewed by the Joint Meeting in 1971. A report [D. C. ABBOTT and J. O'G. TATTON, *Pest. Sci.* **1**, 99 (1970)] on the mercury content of the total diet in England and Wales was introduced by Dr. ABBOTT and the preparation of a book under the auspices of FAO-IAEA was also mentioned.

## **9. Rethrins and Synergists**

Dr. MOORE agreed to review progress in GLC methods.

## **10. Other Compounds**

(a) Dr. RESNICK introduced his report (Appendix 4) on dithiocarbamate residue analysis. The CS<sub>2</sub> evolution methods could be regarded as adequate if all compounds responding to this test were of similar toxicity. Specific tests for the degradation products ethylenethiourea and ethylenethiuram monosulphide might be required. These compounds were to be reviewed by the Joint Meeting in 1970. It was suggested that the Secretary should contact the Chairman of the COMECON Symposium on Dithiocarbamates to be held in Dubrovnik in October, with a view to obtaining a copy of the Proceedings.

(b) Dr. ABBOTT mentioned two publications on methods for residues of carbamate insecticides and herbicides [COHEN *et al.*, *J. Chromatog.* **43**, 233 (1969); **49**, 215 (1970)].

(c) The possibility of the need for some studies on systemic fungicides was discussed briefly; Dr. RESNICK agreed to review this field.

## **II. Publication**

The Secretary was authorized to arrange for publication of the proceedings of the Commission by IUPAC in the *Information Bulletin* and for a summary to be published in *J. Assoc. Offic. Anal. Chem.*

## **12. Arrangements for Next Meeting**

It was announced that the next meeting would be held in Washington, DC, USA, in July 1971 during the XXVIth IUPAC Conference.

D. C. ABBOTT

## **Appendix I: Multiresidue Methods of Analysis for Organochlorine Compounds**

During the past year work had been continued to study and improve recommended multiresidue methods.

1. A method for separating polychlorinated biphenyls (PCBs) from DDT and its analogues had been developed and published by ARMOUR and BURKE(1). The method was applicable to samples prepared by the FDA methods for multiple pesticide residues. The separation was made on a silicic acid-Celite column. PCBs were eluted from the column with petroleum ether prior to elution of pesticides with a mixture of acetonitrile, hexane, and methylene chloride. Determination of PCB and pesticides could be made on the separate column eluates. Recoveries of Arochlors 1254 and 1260 and of several chlorinated pesticides through the separation ranged from 76-100% and 80-107%, respectively. Aldrin was not separated from PCB; however, lindane, heptachlor, heptachlor epoxide, dieldrin, and endrin were. Since aldrin would not normally be found in the type of product containing PCB, the lack of separation of aldrin from PCB was not too serious.

2. A report by BURKE *et al.* (2) showed that the FDA procedure or the Bertuzzi modification for samples of low water content were not effective in extracting residues in potatoes absorbed from treated soil. Recoveries were as low as 30%. No solution to this problem had been achieved.

3. The behaviour of some chlorinated naphthalenes in the methods for organochlorine pesticides and PCBs had been made by ARMOUR and BURKE (3). There were some chlorinated naphthalene compounds which had some characteristics and uses similar to PCBs which prompted a study of their behaviour within the methods for PCBs and pesticides. It had been found that the chlorinated naphthalenes studied did come through the multiresidue method for organochlorine compounds and would interfere with pesticide analysis. However, the silicic acid column chromatographic procedure previously developed and reported to separate PCBs from the pesticides also separated the chlorinated naphthalenes from the pesticides and thus permitted GLC determination without interference.

4. A study was made of the extraction efficiencies of various methods for removing residues from fish, mammal, and poultry tissues. Great variability in the amount of fat in these tissues from species to species or animal to

animal had created some problems. A method for extracting residues of chlorinated pesticides from these tissues was described by PORTER *et al.* (4). By this method levels of metabolically incorporated chlorinated pesticide residues extracted from fish, poultry, and other meat tissues by the petroleum ether method were equivalent to residue levels extracted by Soxhlet with chloroform-methanol.

5. A preliminary test had been made to determine the extent to which chlorodioxins come through the FDA multiresidue method of analysis. It had been found that the tri(2,3,7-trichloro)- and tetra(2,3,7,8-tetrachloro)-chlorodibenzo-*p*-dioxins behaved as follows:

Tri- and tetrachlorodibenzo-*p*-dioxins were completely recovered through acetonitrile partitioning (PAM I 211:14) (5) using solvents only (2.3  $\mu$ g total; 1.23  $\mu$ g tri and 1.97  $\mu$ g tetra). Normally 3 g of fat or oil were taken for this cleanup.

Recovery of tetrachlorodioxin from beef fat by PAM 211:14 was 70% at the 0.67-ppm level (2  $\mu$ g of dioxins/3 g of fat). Recovery from beef tissue fortified at 0.11 ppm was also 70%. This analysis included extraction of a 50-g sample with petroleum ether (LIB 1082), acetonitrile partitioning (PAM 211:14), Florisil chromatography (PAM 211:15) with 6% and 15% Et<sub>2</sub>O/PE eluates combined, and saponification prior to electron capture GLC.

Recovery of trichlorodioxin from beef tissue or beef fat was not determined because of interfering peaks on chromatograms, both before and after saponification of sample extracts.

Analysis was by EC/GLC using a 5% OV-101 column. Column, injection and detector temperature was 230°C. Five ng of tetrachlorodioxin or 0.12 ng of heptachlor epoxide gave 1/2 full-scale deflection. Because of limited sensitivity, determination was made on a rather small peak in the vicinity of other peaks.

Retention time relative to aldrin on the 5% OV-101 column was 1.62 for tri- and 2.80 for tetradoxin. It should be pointed out that there was some overlap of GLC peaks for the tetradoxin and *p,p'*DDT at these and PAM I GLC conditions.

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### Appendix 2: Multiresidue Methods of Analysis for Organophosphorus Compounds

At the 1969 session of the IUPAC Commission on Pesticide Residue Analysis consideration was given to developments and use of multiresidue methods of analysis for organophosphorus pesticide chemicals. It was recommended and accepted that the recommendation of multiresidue methods for organophosphorus pesticides and their metabolites be deferred. This recommendation



was based largely on the lack of information on validation of the recovery values of the organophosphorus compounds through the procedures under consideration because of the varying polarities of the different compounds.

One multiresidue method considered last year was that of ABBOT *et al.* (1) (published after the 1969 considerations) used to analyze for residues in total diets. The method described in the above publication included 3 different extraction and 3 different cleanup procedures for 7 different commodity groups which comprised the total diet. The samples prepared by these procedures were then submitted to 2 different determinative steps, total phosphorus and/or gas liquid chromatography utilizing a phosphorus sensitive detector. Thirty-nine different pesticides and some of their metabolites were recoverable by this method with a sensitivity of *ca.* 0.01 for most compounds. No data were presented in the publication on the percentage recovery of these compounds, but the authors had stated that the recovery was 70% or better in all cases.

Another method considered last year was an unpublished report by STORHERR *et al.* which was still unpublished. This report described a procedure in which an aliquot of the acetonitrile extract prepared for the multiresidue analysis for organochlorine compounds (that is the one from FDA PAM accepted last year as the IUPAC recommended method) was used for a multiresidue analysis for organophosphorus residues. The acetonitrile extract (which contained the water from the plant material) was diluted with methylene chloride freeing the water. Following separation, the acetonitrile-methylene chloride solution was cleaned up with charcoal. The percolate was evaporated and the residue redissolved in ethyl acetate before injection into a gas chromatograph.

Of course the charcoal was a critical part of the method. Originally, Norite SG Extra and Nuchar C190N were considered equivalents in the procedure; however, in a preliminary interlaboratory test it was found that although the Nuchar was satisfactory for many crops it was not adequate for some, especially spinach. This necessitated a delay of a full collaborative study. In the author's laboratories the method yielded from 85 to 105% recovery of 41 different pesticides and their metabolites when added to kale. Quantities of the compounds which gave from 20 to 50% full-scale deflection were added. These quantities varied from 0.01 (3 compounds) to 0.80 (Ciodrin) and 0.40 ppm for 2 compounds (Cuomaphos and azinphosmethyl). Most compounds varied from 0.02 to 0.10 ppm.

In other experiments 0.02-0.4 ppm of 10 different compounds were added to apples, carrots, green beans, lettuce, and strawberries; recoveries varied from 85 to 117%. Also 8 different compounds added to kale at levels varying from 0.04 to 0.028 ppm were recovered in the range of from 96 to 116%. Preliminary experiments with a flame photometric detector gave even greater sensitivity.

A two-dimensional thin-layer chromatographic (TLC) procedure was developed by GARDNER (unpublished) for confirmation of the results obtained by GLC. This TLC method differed significantly from all others in that more specificity was obtained on the TLC plates (silica gel G) by oxidation of the organophosphorus pesticides *before* development in the second direction.

*Discussion.* The outlook for the future of the various types of pesticide chemical since the 1969 meeting had taken a more firm course. There had been strong recommendations in many countries on reducing the use of the more persistent organochlorine pesticides for which very good methods of analysis existed. Replacements would come from the organophosphorus and the carbamate compounds for which the Commission did not have verification

of really good methods of analysis for monitoring residues in the food supply or in other elements of the environment.

*Recommendations.* The Commission did not have all the data it would like to have to make recommendations for IUPAC adoption of multiresidue methods for organophosphorus compounds; however, it was imperative that support for these methods be developed quickly:

1. It was recommended that both the ABBOTT method discussed above (excluding the total phosphorus portion) and the STORHERR method be adopted as a basis for methods for multiresidue analysis.
2. It was recommended that the Section encourage the further development and validation of these and other procedures.
3. It was recommended that confirmatory tests be further developed for the confirmation of residues of organophosphorus pesticides.

#### *Reference*

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### **Appendix 3: Analytical Methods for Fumigant Analysis**

Few papers concerned primarily with analytical methods for fumigant residues had appeared in the period since the 1969 report to the Commission. Accounts of work on the nature and amount of fumigant residues which were properly reported to the Commission on Terminal Pesticide Residues could also provide evidence on the acceptability and reliability of the analytical methods employed. Reference could also be made to developments in analysis forming part of investigations in the Pest Infestation Control Laboratory, Slough (UK) not yet published.

A. *Multiresidue Methods for Volatile Fumigant Residues.* The results of investigations in the laboratory of the US Food and Drug Administration, Washington, first reported in the proceedings of the 1968 meeting of the Commission, had now been published (1). An acid reflux method was preferred for extraction from grain of the six fumigants examined (carbon tetrachloride, carbon disulphide, ethylene dichloride, ethylene dibromide, methyl bromide, and chloroform). Separation was effected on a column of DC 200 on Gas Chrom Q and estimation by an electron capture detector.

Collaborative studies by a group of laboratories in the Netherlands on the disappearance of carbon tetrachloride, ethylene dichloride, and ethylene dibromide from fumigated wheat during storage and processing to bread were described by WIT *et al.* (2) and reported upon here by KENAGA (3). Analysis for volatile residues was carried out independently by two laboratories using the method of extraction involving steam distillation and collection in toluene as developed by KENNET and HUELIN (4) and BIELORAI and ALUMOT (5). The toluene solution was injected directly into a gas chromatograph. For ethylene dichloride an Apiezon L on Chromosorb P column was used with flame ionization detector. For carbon tetrachloride and ethylene dibromide a Carbowax 20M on Chromosorb W-HMDS column was used with electron capture detection. Large discrepancies between the results of the two laboratories were reported. However, in a subsequent collaborative study when carefully prepared samples of flour treated with ethylene dibromide were analysed synchronously with precise adherence to the standard procedure, excellent agreement was obtained. It was concluded that the discrepancies were due to differences in samples or in the timing of analyses.



ALUMOT and BIELORAI (6) had continued their studies of the residues in cereals of a fumigant mixture (carbon disulphide, carbon tetrachloride, chloroform, and trichloroethylene) using steam distillation with toluene extraction and GLC separation on a silicone oil DC 710 on Chromosorb W-HMDS column with electron capture detection as previously described (5).

The comprehensive scheme developed at the Pest Infestation Control Laboratory and reported at the 1969 meeting had also been published (7). GLC using two types of column and three detector systems was used to analyse the contents of acetone-water or acetonitrile-water extracts. With minor modifications these methods had been successfully employed in a number of investigations over the past year involving the examination of a range of foodstuffs. At the 1969 meeting it was agreed that an attempt should be made to obtain independent confirmation from other laboratories of the acceptability of this scheme and an approach was made to six laboratories known to have some interest in fumigant residues. However, no satisfactory collaborative studies proved feasible.

**B. Unreacted Methyl Bromide.** SCUDAMORE and HEUSER (8) had published the results of an extensive investigation on the rates of disappearance of methyl bromide, from a variety of fumigated commodities when freely exposed for airing or when sealed in containers. Methods previously described (9) were used including extraction at room temperature by an acetone-water mixture, separation by a polypropylene glycol on Chromosorb W column, and determination by flame ionization detector. The apparent percentage extraction of methyl bromide was checked. In the case of the more reactive materials, failure to achieve 100% recovery was due mainly to the continuing reaction of methyl bromide with the commodity during extraction, but in the case of cocoa beans, which only reacted slowly with methyl bromide during the extraction process it appeared that the acetone-water system was itself not particularly efficient. There were also large variations in behaviour between individual cocoa beans.

**C. Inorganic Bromide.** There was continuing interest in the determination of bromide content of foodstuffs either to check that tolerances were not exceeded or as a guide to the extent of any treatment with a reactive brominated fumigant such as methyl bromide. Usually a chemical method which determined total bromide was employed. Thus THOMPSON and HILL (10), for a survey of bromide in maize, pulses, and nuts entering UK ports or fumigated after entry, followed a widely used general procedure involving treatment with alcoholic potash, ashing, aqueous extraction, oxidation of bromide to bromate with hypochlorite, and titration with sodium thiosulphate of iodine released by the bromate from acidified potassium iodide solution.

WIT *et al.* (2) used the same procedure but with preliminary treatment of the sample with monoethanolamine-dioxan mixture as described by HEUSER (11) to determine total bromide in cereals treated with ethylene dibromide. Total dibromide was also determined on parallel samples by thermal neutron-activation analysis and generally good agreement was obtained. They drew attention to the risk and undesirability of reporting and considering bromide determined by these methods as inorganic bromide if there was a possibility that a substantial part was present as an organic bromide such as ethylene dibromide.

HEUSER and SCUDAMORE had developed a method for the selective determination of inorganic bromide (bromide ion) by GLC, with simultaneous measurement of residual methyl bromide and ethylene dibromide if desired. The method was based upon the specific reaction of inorganic bromide present



in the commodity with excess of ethylene oxide in an acidulated solvent to form ethylene bromohydrin. This was extracted from the substrate and then separated from the unchanged organic bromides by GLC, using a polypropylene glycol on Chromosorb W column and an electron capture detector. A sensitivity better than 1 ppm of  $\text{Br}^-$  was obtained, in the presence of large excesses of organic bromide. The method did not in itself cause the breakdown of organic bromide to the ionic form. An account of the method had been submitted for publication.

D. *Residues arising from Ethylene Oxide Treatments.* HEUSER and SCUDAMORE had developed modifications of their multidetection scheme which allowed determination by GLC of ethylene glycol, diethylene glycol, and 2-bromoethanol (ethylene bromohydrin) residues in a range of foodstuffs treated with ethylene oxide, in addition to determination of residual ethylene oxide and ethylene chlorohydrin, already included in the scheme. The rate of extraction of the hydrophilic glycols from treated commodities, such as cereals and dried fruit, was considerably improved when the proportion of water in the solvent (originally 5:1 v/v acetone/water or acetonitrile/water) was increased. However, increased extraction of water-soluble interfering substances, especially from sultanas, necessitated more complex cleanup and drying procedures. In some cases it was considered that there was an advantage in keeping to a low proportion of water in the solvent to minimize interference from these other compounds, despite the consequent requirement of extraction periods of up to 48 hours. Ethylene glycol and diethylene glycol were determined using a flame ionization detector and ethylene bromohydrin by flame-ionization or by electron capture detection, the latter being far more sensitive for this compound. When determining the glycols by GLC it was frequently noted that a proportion of each injected amount of a glycol was retained on the column, even when symmetrical nontailing peaks were obtained, e.g., on nonpolar Porapak columns. The part retained could subsequently be eluted by water injections. This behaviour, which occurred with many other types of column packing, seriously impeded quantitative determination of small amounts of glycols since with reduction in the amount injected, an increasingly large proportion, ultimately approaching 100%, was retained on the column packing. The problem was solved by the use of a Teflon-based support with polyethylene glycol as stationary phase. An account of this work was being prepared for publication.

MACHON and BUQUET (12) had determined residues of ethylene chlorohydrin in bread treated with ethylene oxide. They extracted the bread either with diethyl ether, according to RAGELIS *et al.* (13), or with a mixture of acetone and water according to HEUSER and SCUDAMORE (14) and (9) and determined the residues by GLC using silicone oil on Diatoport S in the column and a hydrogen flame ionization detector.

BROWN (15) had determined ethylene oxide and ethylene chlorohydrin in plastic and rubber surgical equipment sterilized with ethylene oxide. A *p*-xylene extract of the sample was passed through three chromatographic columns in series. The top column (I), which collected the ethylene chlorohydrin, consisted of Florisil. The second column (II), mounted directly below the first column, consisted of Celite mixed with dilute HCl and converted the extracted ethylene oxide to ethylene chlorohydrin. The third column (III) placed directly below column II, also contained Florisil and collected the ethylene chlorohydrin formed. After removal of *p*-xylene, the ethylene chlorohydrin collected on columns I and III was eluted separately with ethyl ether and further purified if necessary by sweep codistillation before analysis by

GLC. A flame ionization detector was used with a column packed with either Carbowax 20M or Ucon 75-U-90,000 on a Gas Chrom Q support. A linear response for ethylene chlorohydrin was obtained over the range 26 to 419 ng, the lower limit of detection being approximately 25 ng.

E. *Residues from Use of Phosphine Fumigants*. In the 1969 report to the Commission advance information was given of an examination of sensitive detectors for the determination of phosphine by GLC. An account of this work was now published by BERCK, WESTLAKE and GUNTHER (16). Micro-coulometric, thermionic, and flame photometric detectors were tested on air samples injected directly into the detector or column. The flame photometric detector was preferred and had been employed by BERCK and GUNTHER (17) in a study of the sorption of phosphine by food and other materials but there had been no report from this group of workers on any direct determination of residues after fumigation with phosphine.

DUMAS (18) had also tested the thermionic (flame ionization phosphorus) detectors for the determination of very low concentrations of phosphine in air using a column filled with Apiezon L on Chromosorb W.

ROBINSON and BOND (19) had used measurement of radioactivity to demonstrate the presence of phosphorus residues after treatment of wheat, flour, insects, and cystine with  $^{32}\text{P}$ -labelled phosphine. They found that the residual  $^{32}\text{P}$  on wheat and flour was not removed by thorough aeration or by heating at baking temperature, but was largely water soluble and consisted mainly of hypophosphite and phosphite. At practical fumigation, dosage levels of the order of 0.04-1.2 ppm *calculated as phosphine* were indicated. This order of total residue in grain of normal moisture content was in line with results obtained by HESELTINE (20) using conventional chemical methods and with results now emerging from a more comprehensive investigation of the amount of reaction of phosphine with foodstuffs undertaken by DISNEY and FOWLER in the Pest Infestation Control Laboratory, Slough, using  $^{32}\text{P}$ -labelled phosphine. Reaction was greater on grain of higher moisture content.

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#### **Appendix 4: Interim Report on Current Status of Residue Methods for Specific Dithiocarbamate Fungicides and Related Compounds**

The lack of specific residue methods for the numerous dithiocarbamate fungicides, which were used widely in world agriculture, was a cause of concern to the FAO-WHO Joint Meeting and to many government agencies around the world.

The development of highly sensitive analytical methods for residues of the specific dithiocarbamates and related compounds was indeed a most complex task. Until today, the most used residue technique was based on the colorimetric determination of  $CS_2$  which was evolved when the residue was decomposed, by hot mineral acids, following mainly the procedure prescribed by the CULLEN method (1). Some modifications had been inserted recently in the original Cullen method by KEPPEL (2), by adding a reducing agent [tin(II) chloride] to the sample prior to digestion with hot acid, and the use of lead acetate solution instead of diluted sodium hydroxide to remove the interfering  $H_2S$ . However, with all the ease of carrying out the modified CULLEN method the problem at hand had not been solved, since:

1. The modified method was still not specific, and all dithiocarbamates would react similarly.
2. The presence of any volatile compound might interfere with the  $CS_2$  determination.
3. Reproducibility and precision were still a problem, especially with maneb and nabam.

In the face of the acute need for improvement of present methods and the development of new approaches, MCLEOD and MCCULLY (3) had recently proposed the use of a head space gas procedure for quickly determining residues of fungicides belonging to both the dimethyldithiocarbamate group (ziram, ferbam, thiram) and to ethylenebisdithiocarbamates (maneb, zineb, nabam) in plant substrates. In this procedure,  $CS_2$  was carefully evolved under highly controlled conditions of time, temperature, and reagent concentration, then determined by GLC with the Melpar flame photometric detector. This new technique also suffered from lack of specificity, and if the identity of the dithiocarbamate residue was not known, an appreciable element of error would appear in the calculations. Thus it seemed that this technique could mainly be used for screening purposes only.

Unfortunately, not too much work was currently being done on this problem. More than a dozen major laboratories in USA, Canada, Europe, and Japan had indicated that they had either discontinued work on the specific methodology or that their many efforts uptodate were not successful. One interesting approach reported was the conversion of the parent compounds and their alteration products to ethylenediamine for analytical evaluation. However, difficulty was experienced in converting all the possible alteration products to these compounds. Specific methods for ethylenethiourea were also being examined.

The following quotation from recent correspondence on this subject summarized the current status:



'Your task of assembling a comprehensive report on the status of analytical methods for determining residues of dithiocarbamate fungicides and related compounds by 15 July is formidable.

We are not currently conducting research on specific methods for determining residues of the dithiocarbamate fungicides primarily because of the many relatively fruitless efforts which have already been made along these lines.

... residues of dithiocarbamate fungicides, particularly the ethylenebis series, are extremely difficult to purify to permit specific determination of individual molecular species. This is because of their insolubility and their inherent instability during attempted isolation. In addition, these non-volatile compounds do not lend themselves to gas chromatography without degradation, and this has precluded reliable determination of specific dithiocarbamate fungicides by this approach. Thus, to our knowledge there are no satisfactory alternatives to the CS<sub>2</sub> evolution method for determining residues of these compounds. Although CS<sub>2</sub> evolution is not specific, it is a reliable and valuable tool for establishing the magnitude of such residues on treated crops.'

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## COMMISSION ON EQUILIBRIUM DATA (V.6)

Zakopane, 18 September 1970

*Present:* Prof. D. N. HUME (Chairman), Dr. F. J. C. ROSSOTTI (Secretary), Prof. M. T. BECK (Titular Members); Dr. S. AHRLAND, Prof. H. FREISER (Associate Members); Prof. A. E. MARTELL, Prof. K. B. YATZIMIRSKII (National Representatives). Dr. E. HÖGFELDT (Observer) was in attendance.

### I. Stability Constants of Metal-Ion Complexes

Prof. MARTELL reported that page proofs of the supplement to the second edition of the Tables, which updated the literature survey to the end of 1968, had been returned to the Chemical Society (London). Although proofs for neither the revised section on how to use the Tables, nor for the index had been received, publication was expected early in 1971. The problem of cross-indexing mixed complexes was discussed.

Concern was expressed that the Chemical Society had advertised the first and second editions only in its own publications. Dr. ROSSOTTI agreed to urge the Chemical Society to publicize the supplement more widely.

Prof. MARTELL, who had been responsible for the sections on organic ligands in both the second edition and its updating, intimated that he wished to hand over responsibility for a further updating. It was agreed to ask Dr. PERRIN to assume this responsibility. A new project leader *vice* Prof. SILLÉN was also required for the sections on inorganic ligands. Dr. HÖGFELDT, who had helped SILLÉN during his long illness, offered to organize these sections, with the aid of other helpers in Stockholm and, for example, in Eastern Europe. Work was currently in progress on the literature for 1969-70. Prof. HUME agreed to write formally to the President of the Ukrainian Academy of

Sciences to invite Prof. YATZIMIRSKII to help with the Russian literature and it was agreed to ask Prof. YAMASAKI to help with the Japanese literature.

## **2. Distribution Equilibria**

It was understood that the compilation of Profs. MARCUS and KERTES was nearing completion. Some concern was expressed about the nomenclature for extracting ligands: in particular whether to use trivial names or the same scheme as for the stability constant tables, or whether the Commission on Analytical Nomenclature (VI.3) should be consulted. Prof. FREISER agreed to circulate alternative proposals.

## **3. Selected Values of Stability Constants**

It was agreed that this project should be terminated as a consequence of Prof. SILLÉN's death.

## **4. Critical Surveys of Stability Constants**

Prof. BECK had received comments on his introductory article and hoped to circulate a revised version shortly. His survey on cyano complexes had already been circulated. Dr. ANDEREGG was still working on the EDTA system. Dr. VASIL'EV was understood to have completed his survey of the bismuth halides, and PESHCHEVICKII one on gold complexes. The last two surveys were in Russian and therefore needed to be translated.

## **5. Information Retrieval**

Prof. LEUSSING had established informal contact with *Chemical Abstracts* on the problems of identification of papers containing equilibrium data.

## **6. Standard Ionic Media**

No progress report had been received from Prof. BIEDERMANN.

## **7. Sillen**

Prof. HUME agreed to write to Mrs. SILLÉN to express the sympathy of the Commission at her recent bereavement and appreciation of Prof. SILLÉN's long standing contributions to the work of the Commission.

F. C. J. ROSSOTTI

# **SECTION ON PULP, PAPER, AND BOARD (VI.7)**

**Stockholm, 1 November 1970**

*Present:* Dr. K. WARD, JR. (Chairman), Dr. C. A. SANKEY (Secretary), Mr. P. H. PRIOR, Dr. M. RUTSHAUSER (Titular Members); Prof. T. NORIN, Mr. I. PALENIUS (Associate Members). Mr. O. ELLEFSEN (Observer) was in attendance.

## **1. Introduction**

Dr. WARD expressed his thanks to Prof. NORIN for making the local arrangements for the meeting. Prof. NORIN welcomed the participants to the Swedish Forest Products Research Laboratory and detailed arrangements for the day.

Dr. WARD had received apologies for non-attendance from Mr. ANKER-

RASCH, Mr. HAVRÁNEK (Titular Members); Dr. BHARGAVA (Associate Member). Mr. ANKER-RASCH, because of his new position, would be unable to continue his activities in the Section. Mr. ELLEFSEN had been invited to the meeting to represent the Norwegian view. Dr. WARD had not heard from Prof. ROGOVIN, Prof. MIGITA or Dr. MØNZIE regarding their attendance. The death of Dr. COHEN during the year was deeply regretted and news had just been received of Prof. CENTOLA's recent death.

The meeting would, throughout, be particularly concerned with the future of the Section.

## **2. Minutes of Previous Meeting and Matters Arising**

The minutes of the meeting at Oxford, UK (26th September 1969) were approved as circulated. They indicated the availability of microfilms and abstracts of papers which would have been given at the Symposium in Prague in 1968 (cancelled). There would be no other publication. The proposed IUPAC-APPITA Symposium in Australia was no longer being considered in view of Dr. COHEN's death.

Regarding the *Thesaurus*, Dr. WARD reported that the key-word index was being revised by IPC and PPRIC with well in excess of 2000 entries and it was now separate from the *Engineering Thesaurus*. In the view of IPC it would be early summer 1971 before this was ready. Computer and information retrieval were increasingly available at IPC. Use of such data was primarily regional. Internationally available computerized indices were still utopian. Dr. SANKEY agreed with Dr. GENDRON's view (circulated to Members of the Section since the last meeting) that as the work of indexing had been done, it should be accepted as completed.

Language problems were primarily a matter of adequate translation of key words from the English. Dr. WARD had received a report on information retrieval from TAPPI. He would arrange to have it copied and distributed through the IUPAC Secretariat subject to the notation that it was preliminary and would be revised. Mr. ELLEFSEN asked if translations of key words were being undertaken. Dr. WARD advised that Prof. CENTOLA had begun translations into Italian but had stopped pending the issue of the new thesaurus. Reference was made to Dr. TÖPPEL's publications in *Das Papier* as circulated to the Section. Mr. ELLEFSEN and Mr. PALENIUS referred to work on Swedish, Norwegian, and Finnish translations but believed use of the English work where possible would reduce difficulties. The problem of international common terminology would always be with us. Russian usage was increasing greatly. Dr. WARD commented on the lack of adequate Japanese language facility at IPC. The consensus of the meeting was that, while there was no ideal, the best solution in practice would involve computerizing in one language with careful translation of key words on a national basis.

## **3. Nomenclature and Symbols**

This item was deferred pending the expected arrival of Dr. TÖPPEL.

## **4. Analysis and Testing**

Mr. PRIOR introduced his report which considered the nature of the problem, particularly in UK, of components, sometimes traces only, in products which components were considered harmful to human and/or ecological well-being. Adequate methods of analysis were sometimes unavailable. He asked if such analytical developments were within the capability of the Section: there was



a UK committee considering leaching of chemicals from products whose first report was lacking in depth. The UK Technical Section had not set up its own committee.

Dr. WARD indicated that this was not within the terms of reference of Section VI.7 except, perhaps, as an agency for collecting information. It was agreed that each Member of the Section would find out what was being done in his own country. Mr. ELLEFSEN asked if there were methods or standards for residual pesticide residues. Mr. PRIOR said there was very limited information and it was handled by Commission VI.5.2.

Prof. NORIN emphasized that the Section's interest was just pulp and paper—Which components were extractable? Which components were formed during ageing? How did wood components change during pulp and paper manufacturing processes?

The consensus was that the Section should limit its review and action to pulp and paper products, get this together with reference to each Member's country and submit to Mr. PRIOR who would report at the XXVIth IUPAC Conference (Washington, DC).

## **5. Discussion with Forestry and Forest Industries Division of FAO**

Dr. WARD reviewed the background to this item. An informal contact existed between himself and the FAO Director, Dr. B. STEENBERG.

Consultative status for the Section with FAO had been recommended to the IUPAC Executive Committee. However, the latter felt that the needs of FAO in this area should be more clearly defined. The matter had been referred for the advice of the President of the Applied Chemistry Division, Dr. GALLAY. Dr. SANKEY would check with Dr. GALLAY prior to the Washington meeting if there was no action sooner.

## **6. Proposed Symposia**

No one had seen any report of the international seminar in India during December 1969. Prof. NORIN said that Prof. STOCKMAN had been at the meeting.

Mr. PALENIUS reported that the Finnish Pulp and Paper Research Institute was working with a Russian group on soft wood kraft pulping of wood waste including stump, crown, and branches. With the related problems of collection and environmental effects this was a topic of increasing international interest. Dr. WARD believed there was significant material being developed in North America and thought this might be an excellent symposium project for say 1973-74. His suggestion was that IUPAC should take the initiative and bring in FAO later. Mr. PALENIUS would check with Prof. JENSEN as to the latter's reaction and report at Washington. As to possible locale, Finland would be doubtful because of the 1972 *Symposium on Man-made Polymers*. Dr. WARD wondered about USSR although Prof. ROGOVIN's primary interest was not in wood waste. Would Prof. SHARKOV, Dean of the Institute in Leningrad, be the man to contact? Could a symposium be held in Leningrad? Mr. PALENIUS would advise as to names and addresses of possible Soviet contacts. Such a symposium should not be later than 1974. The action agreed was (a) PALENIUS to advise as above and keep contact with ELLEFSEN and NORIN; (b) WARD will check as to US interest; (c) SANKEY will check with Dr. GARDINER as to Canadian interest.

Dr. WARD had changed his mind and now recognized the importance of symposia as a main function of the Section. North American symposia tended

to be parochial. Even EUCEPA did not include USSR. There was a definite function for the Section here.

In reviewing symposia now underway, Dr. WARD referred to the *Man-made Polymers Symposium* (5-8th June 1972, Helsinki) for which sponsorship had been approved by IUPAC. The tentative schedule would be circulated with the minutes. Mr. PALENIUS expected a full programme. Accommodation could be arranged for 300-800 participants. Dr. SWANSON (IPC) was a good US contact for the organizers. This symposium appeared to be in excellent hands.

Regarding the *Vth International Symposium on Carbohydrate Chemistry* (Madison, Wisconsin), Dr. WARD reported that it would open on 20th August 1972. The Section's interest would be restricted to a half- or one-day session with no financial aspects involved for IUPAC. The Programme Chairman was Dr. S. P. ROWLAND (Southern Regional Laboratories, New Orleans). Dr. WARD had written to bring this symposium to the attention of Prof. ROGOVIN and would follow up if there was interest.

Dr. K. P. KRINGSTAD (North Carolina State University) had been in touch with the IUPAC Secretariat concerning a bleaching symposium in 1972. Dr. WARD had advised him of the symposium on carbohydrates and IUPAC would not be further involved.

Dr. WARD referred to conversations while at theACHEMA Congress in Frankfurt regarding possible IUPAC association with a 1973 meeting in Hamburg on non-woven fibres. In discussion the consensus was that the Section's primary interest was in the present state of the art rather than in a general symposium. Papers concerned with product properties (really advertising) and without disclosure of details of composition must be avoided. Mr. PRIOR pointed out that most of the work in this field was not chemical. Dr. WARD would have a further report available at Washington.

Dr. SANKEY referred to correspondence indicating that IUPAC association with a Canadian conference was not feasible. A letter had now been received from Dr. D. W. CLAYTON, Chairman of the *IVth Canadian Wood Chemistry Symposium*. Dr. SANKEY had been asked to join the symposium committee and IUPAC participation was of interest. On discussion it was agreed that IUPAC participation would be worthwhile and the necessary approval would be sought when further information was available. There would be no direct subvention requested from IUPAC for the symposium but assistance regarding transportation of one or two European contributors would be recommended. Clearance would also be asked for publication of papers in Canadian journals subject only to a IUPAC reservation for, at most, papers by authors assisted by IUPAC and these should also be cleared if the proceedings of the whole conference were published as a unit. Referring to Dr. CLAYTON's letter, the consensus was that too many subjects were included. Dr. SANKEY would transmit this view with the suggestion that the last two of the suggested five subjects be omitted from the programme. Dr. SANKEY would follow up on developments and make recommendations at Washington.

## 7. Membership

All Officers of the Section would retire in 1971. Of the 8 Titular Members, including Officers, 2 were from North America and 6 from Europe, with the latter including 1 from Eastern Europe, 1 from Scandinavia, 1 from UK, 1 from Italy or France, 1 from Germany or Switzerland. However, there was no basic reason why this distribution should not be varied to meet the circumstances. For example, the Chairman and Secretary should be easily accessible to each other.



In North America, there was some lack of interest with the national pulp and paper associations. Dr. WARD had suggested Mr. W. AITKIN (V.P. Research and Development, Union Camp) and a past chairman of TAPPI as his successor from USA. Dr. SANKEY had not made a formal recommendation, pending developments as to the future of the Section, but his recommendation would be for the chairman or an active past chairman of the Research Committee of the Canadian Technical Section. Mr. PRIOR would consult with his colleagues in UK before making a recommendation.

Future Officers of the Section were then discussed. The Chairmanship and Secretaryship should be centred as either German-speaking or in Scandinavia. In the absence of Dr. TÖPPEL and the unwillingness of Dr. RUTISHAUSER to consider the Chairmanship, the consensus was that recommendation should be for Scandinavian candidates for these Offices. Because Prof. JENSEN had already represented Finland as Chairman the obvious recommendation would be for Mr. PALENIUS and Mr. ELLEFSEN (as successor to Mr. ANKER-RASCH). This would mean 2 Titular Members from Scandinavia. It was agreed that Mr. PALENIUS and Mr. ELLEFSEN would consult with their associates and advise Dr. SANKEY, following the meeting, of their decision and that their agreed decision would become a recommendation of the Section.

(Note. Mr. ELLEFSEN advised the Secretary that it had been agreed he should be recommended for the Chairmanship and Mr. PALENIUS for Secretary. The intention was that Mr. ANKER-RASCH would submit his resignation and Mr. ELLEFSEN could then be nominated in his place as a Titular Member for Norway and presumably able to attend the Washington Conference in that capacity.)

A general discussion on other membership followed. Prof. ROGOVIN would retire. In view of the symposia on wood waste pulping, perhaps the Soviet authorities might consider nominating Prof. SHARKOV as a Titular Member. Would Dr. GRANDIS be available from Italy? He had had previous membership and might assist continuity. Dr. WARD would write to Dr. MONZIE about French representation. This had been substantially inactive and more participation would be welcomed. Dr. WARD understood that Prof. MIGITA wished to be replaced from Japan. Presumably, Dr. BHARGAVA from India would remain on the Section. Australia should be asked for a nomination for Associate Membership.

### **3. Nomenclature and Symbols (continued)**

Discussion was resumed but was necessarily limited because of Dr. TÖPPEL's absence. His considerable work in this field emphasized the problems as discussed under item 2, *e.g.*, an abbreviation *FIS* for space would be unacceptable in English-speaking countries. It was seriously doubted that international agreement could ever be obtained on a number of terms. The Section could only *suggest* standardization since international standardization was ISO's job. Mr. ELLEFSEN said that ISO was concentrating on common terminology, which tied in with IUPAC's Inter-Divisional Committee on Nomenclature and Symbols. Dr. WARD would contact this Committee and advise. He questioned if the slavic languages would accept non-slavic abbreviations.

### **8. Date and Place of Next Meeting**

This would be at the XXVIth IUPAC Conference (Washington, DC) on 15th July 1971.



## 9. Other Business

The meeting concluded with a general review of the function of the Section, its successes and failures, and what could be done to increase its viability. (i) The status of nomenclature and symbols had not been dealt with in a satisfactory manner at this meeting. Dr. TÖPPEL should be asked to send out his questionnaire through the IUPAC Secretariat. The basic question remained as to whether this was or what phases of it were proper Section activity.

(ii) The analysis and testing work could not become a programme until more data were collected and reviewed at Washington. Mr. PRIOR emphasized that there was real need for international action by somebody in this field.

(iii) The strongest current programme was in symposia to which a unique international approach could be supplied. An essentially good job had been done in promoting international cooperation.

(iv) The service function of the Section had not been adequately utilized and its availability needed to be emphasized at the national level. This was important and needed strong emphasis. Section Members could and should function as channels for enquiries in view of the contacts existing within the Section.

(v) Prof. NORIN asked if other Sections had similar problems. Dr. WARD answered that Sections VI.2 and VI.8 had had difficulties.

(vi) The unanimous consensus was that the Section had a real function based on the unique character of IUPAC itself as a worldwide organization. It should have more to do in the future as available raw materials changed and environmental problems became more serious.

Mr. ELLEFSEN asked about the legal consequences of pollution as between countries. The great importance of this was recognized but it was not within the Section's terms of reference. Mr. PALENIUS pointed out that recommendations as to analytical methods could be valuable, granted that such recommendation would have no authority.

C. A. SANKEY

## SECTION ON WATER, SEWAGE, AND INDUSTRIAL WASTES (VI.8)

**Stockholm, 1 and 6 November 1970**

*Present:* Dr. S. FREYSCHUSS (Chairman), Mr. B. GÖRANSSON (Secretary), Dr. P. N. J. CHIPPERFIELD, Dr. P. DALCQ, Mr. H. PETERS, Prof. K. STUNDL, Prof. W. TESKE (all Titular Members).

1. At the meeting on 1st November questions concerning the *International Congress on Industrial Waste Water* (see p. 76) were discussed and certain tasks during the Congress were distributed among the Members. All other discussions were continued in the meeting on 6th November.

2. The Members gave reports on their experiences and impressions from the Congress. The conclusions were as follows.

The quality of main lectures was, in general, very good and the quality of other papers presented varied but was generally good with some peaks.

The substantially best parts of the Congress were the sections dealing with pulp and paper industries, chemical industries, and food industries.

It was considered an advantage that papers and presentations were not on too academic a level though this had been desirable with still more reports on industrial applications at the sacrifice of research papers.

The interest among the participants for the sessions dealing with economics, metal and miscellaneous industries, was rather poor. This was especially noted for the metal industries, which ought to take great interest in events of this kind.

The practical arrangements and the organization were quite satisfactory though certain details could have been better.

It was a considerable disadvantage for the discussions at the Congress that preprints of main lectures, for copyright reasons, could not be distributed to the participants.

It was the opinion of the Section that a Congress of this kind, concentrated on the practical applications of research and new technology, served a purpose. On another occasion it would, however, be favourable to concentrate the programme still more than in the present case. The International Association on Water Pollution Research (IAWPR) arranged every second year a conference dealing with water pollution questions on a broad basis. The Section intended to open a discussion with IAWPR about the most appropriate way to arrange conferences and symposia concerning waste water problems.

3. The Chairman reported that, in answer to the invitation from IUPAC, IAWPR had nominated Dr. E. VASSEUR (National Environment Protection Board, Sweden) as a candidate to become an Associate Member of the Section.

4. It was decided that a selection of papers other than main lectures presented at the Congress, should be published collectively. Members should submit their proposals to the secretary before January 1971. Butterworths should be given the first offer to publish such a volume.

5. The composition and the objective of the Section were discussed. With its present composition the Section did not possess adequate competence on all questions within the field of subjects included under 'Water, Sewage, and Industrial Wastes'. Furthermore, it was judged not practical to alter the composition of the Section to achieve this objective. It was decided that at its next meeting the Section should create a proposition for an appropriate reconstruction of the 'Water Section'.

6. The need for standardization of practically applicable and reliable methods for chemical analysis of waste water was discussed. Certain international efforts were already being made in this field, for instance by ISO. However, it must be considered essential that IUPAC had an opportunity to take part in these efforts. It was entrusted to the Chairman to approach other appropriate IUPAC bodies for further discussion on this subject.

7. It was decided that the Section at its next meeting should discuss the question of 'disposal of industrial chemical wastes in the sea'.

B. GÖRANSSON

## **COMMISSION ON ANALYTICAL NOMENCLATURE (V.3)**

**London, 25 November 1970**

*Present:* Prof. H. IRVING (Chairman), Prof. T. S. WEST (Secretary), Prof. E. BAYER, Dr. O. MENIS, Prof. O. SAMUELSON, Dr. W. I. STEPHEN (Titular Members); Dr. D. AMBROSE, Dr. G. BAUDIN, Prof. A. J. B. ROBERTSON (Associate Members). In attendance by invitation: Prof. R. BELCHER (Chairman of Commission on Analytical Reactions and Reagents: V.1), Mr. R. J. M. RATCLIFFE (Assistant Secretary IUPAC), and Dr. G. SVEHLA (Queen's University of Belfast). Apologies were received from Prof. I. P. ALIMARIN, Prof. W.

FISCHER, Prof. R. P. LASTOVSKY, Dr. H. ZETTLER. Correspondence was received from Prof. E. B. SANDELL who was not scheduled to attend the meeting.

1. The Minutes of the previous meeting of the Commission held at Cortina d'Ampezzo (1-4th July 1969) were confirmed.

2. The Status Report from the Secretary on the Commission's projects, July 1969-June 1970, was received and it was noted that in 3.09 and 3.13 the Chairman was Prof. C. L. WILSON of Belfast and not Prof. ADDISON. In line 4 of 3.09 it was also noted that *molarity* should read *normality*.

#### **4. Ion Exchange**

Numerous comments had been received following publication of the tentative nomenclature for ion exchange as Appendix 5 in the series *Tentative Nomenclature, Symbols, Units, and Standards*. These had been collated by Prof. SAMUELSON and his Working Group. As a result of this action, several amendments were proposed and accepted. It was agreed that Profs. SAMUELSON and IRVING should draw up a footnote to meet the objections of Dr. STARÝ to the definition of *Ion Exchanger*. Finally, it was agreed that Prof. SAMUELSON should prepare the definitive (final) version of this report for submission by the Secretary in due course to the Analytical Chemistry Division Committee for publication.

#### **5. Chromatography**

Dr. AMBROSE presented the Working Group's proposals to the Commission. After discussion, amendments to the report were agreed and Dr. AMBROSE was asked to incorporate these in a version to be submitted to the Analytical Chemistry Division Committee for publication as tentative nomenclature.

#### **6. Contamination Phenomena**

The report submitted by Prof. FISCHER and Dr. ZETTLER was considered at length. It was agreed that various points raised by the Commission should be referred back to the Working Group. Discussion of this report was not completed because of lack of time, but it was agreed that Prof. WEST should complete the review along the lines suggested by the Commission and that he should send it to the Working Group for further consideration following approval by Prof. IRVING as Chairman.

#### **7. Mass Spectrometry**

The Commission noted that consideration was being given by IUPAC to the formation of a Sub-Commission on Mass Spectroscopy. The *ad-hoc Committee* should be aware of Commission V.3's activity in this area. It was agreed to submit the report prepared by Prof. ROBERTSON, after he had consulted with Prof. BAYER with regard to incorporation of further definitions, to the Analytical Chemistry Division Committee for publication as tentative nomenclature.

#### **8. Thermal Analysis**

The Commission considered the nomenclature recommendations proposed by the International Confederation on Thermal Analysis. It was agreed that the Commission would support these recommendations without alteration. Prof. WEST would prepare a suitable introduction and submit the report to



the Analytical Chemistry Division Committee for publication as tentative nomenclature.

### 9. Normality/Molarity

The Commission accepted the recommendations of the Working Party under the Chairmanship of Prof. C. L. WILSON. Prof. WEST would prepare a suitable introduction and submit the report to the Analytical Chemistry Division Committee for publication as tentative nomenclature.

### 10. Other Projects

(a) *Trivial Names*. The report prepared by Prof. IRVING and circulated to the Inter-Divisional Committee on Nomenclature and Symbols was accepted by the Commission. This would be submitted to the Analytical Chemistry Division Committee for publication as tentative nomenclature.

(b) *Scales of Working*. Prof. SANDELL had noted that this report was at a fairly advanced stage and the Group awaited comments from interested parties such as the Metropolitan Microchemical Society of New York and the Microchemical Methods Group of the Society for Analytical Chemistry. (Note. Comments from the latter were received subsequent to the meeting.) At the same time the Commission noted the existence of a report entitled *Terminology for Scales of Working in Microchemical Analysis* published by Commission V.2 in *Pure and Applied Chemistry* **1**, 143 (1960) and another on *Recommendations for Terminology to be used with Precision Balances* published by the same Commission in the same place (p. 171). Mr. RATCLIFFE agreed to send copies of these reports to Prof. SANDELL and Dr. MENIS. It was hoped that a draft report suitable for publication as tentative nomenclature might be available at the XXVIth IUPAC Conference in 1971.

(c) *Standard Substances*. Prof. BELCHER, Chairman of Commission V.1, reported that his Commission was preparing to extend its activities beyond those of the CEE contract. In view of this he asked the meeting to consider transferring the Standard Substances project to Commission V.1. After discussion this proposal was accepted. Profs. IRVING and BELCHER agreed to discuss the timing of the transfer at the XXVIth IUPAC Conference. Dr. STEPHEN's appointment as official IUPAC representative to ISO TC/47 WG/16 (Standardization of Reagents) was noted.

(d) *Selectivity Index*. The Commission considered a request that this project should also be transferred to Commission V.1. However, it was felt that the project should be handled jointly by the two Commissions. Prof. WEST and Dr. BAUDIN had indicated to Prof. BELCHER their particular interest in this project.

(e) *Publication of Analytical Methods*. The Commission noted that work was in progress for Gravimetric and Titrimetric Methods under the leadership of Dr. KIRKBRIGHT. It was decided that further discussion should take place at the XXVIth IUPAC Conference by which time reports would be available for comment.

(f) *Kinetic Methods*. Dr. SVEHLA reported that the first draft of this report was ready for circulation.

### 11. Compendium of Analytical Nomenclature

The Commission agreed that publication of a Compendium of IUPAC Analytical Nomenclature was highly desirable. However, this would have to

be coordinated through the Analytical Chemistry Division Committee since certain material had originated from other Commissions within the Division. Furthermore, reports published by the Commission which were at present under review should not be included. The IUPAC Secretariat was requested to act on these suggestions.

## **12. Membership**

The Commission noted the expiry of terms of Membership of Titular Members and agreed to seek approval for a further term for Prof. BAYER under By-Law 4.1303.

## **13. Date and Place of Next Meeting**

This would be held during the XXVIth IUPAC Conference (Washington, DC) on 15-18th July 1971. The meetings would be held in the National Officers' Room of the American Chemical Society.

## **14. Any Other Business**

(a) It was agreed that work on the Liquid-liquid Extraction Project might be reopened. Further discussions would be held in Washington.

(b) It was thought that a project on *Definitions of Sensitivity* should be initiated.

T. S. WEST

# **COMMISSION ON CHEMICAL PLANT TAXONOMY (III.2)**

## **Report of Activities: 1970**

The Commission had continued to pursue vigorously its two main aims: furthering international collaboration and exchange of ideas relating to the application of chemical and biochemical data to taxonomic and other systematic problems in biology, and of encouraging the storage and retrieval of all information pertinent to such problems (see *Comptes Rendus XXV Conference*, p. 123, items 14 and 15).

These concerns were clearly reflected in the two-day meeting held on 11-12th June 1970 in Hornbaek (Denmark). This meeting was attended by all Members of the Commission, including the new Member Dr. S. NATORI, except Prof. G. OURISSON. In addition, Prof. T. BÖCHER (University of Copenhagen) and Prof. B. L. TURNER (University of Texas at Austin) were invited to attend the discussion on the relationship of the Commission to other bodies. During discussion of this item, the Chairman (Prof. A. KJAER) pointed out that the expected collaboration between the Commission and an equivalent Committee established by the International Association of Plant Taxonomy (IAPT) had come to nothing. In early 1970, the Chairman of the IAPT Committee (Prof. LÖVE, Boulder, Colorado) proposed to his parent organization, the establishment of an International Organization of Chemo-systematics (IOC) to parallel the International Organization of Plant Bio-systematics (IOPB) under the auspices of IAPT. It was suggested that 5 members of Commission III.2 should act as Members of the proposed IOC. The proposed establishment of IOC appeared to be the next logical step in the future of chemical taxonomy and the Commission was anxious to help actively in its formation. The Members felt, however, that no firm decisions should be taken without the widest possible consultation.



The Chairman suggested at Hornbaek that the whole matter of IOC might best be examined by a joint *ad-hoc* Committee of Commission III.2 and IAPT. The Commission as a whole approved of this suggestion and proposed that the joint Committee examine ways and means for ensuring the widest collaboration of all those engaged in chemotaxonomy and cognate areas of study. The Commission recommended that HARBORNE, MABRY, and SWAIN act as its representatives on the joint Committee. During further discussion of this aspect of the Commission's work it was pointed out that wide enquiries had shown no other international organizations of a like nature existed in zoology and microbiology. Nevertheless, there was a need to keep in touch with as many other bodies as possible and to invite them to join with the Commission when relevant.

Since the Hornbaek meeting, steps had been taken in all these directions. The joint *ad-hoc* Committee of Commission III.2 with IAPT had been established with the following membership: Prof. W. F. GRANT, Chairman (IAPT), Dr. T. SWAIN, Secretary (IUPAC), Dr. J. H. HARBORNE (IUPAC), Prof. A. LÖVE (IAPT), Prof. T. J. MABRY (IUPAC), Prof. B. L. TURNER (IAPT). The Committee was charged with examining all aspects of establishing an International Organization for Chemosystematics and reporting back to the parent organizations within a year. In addition, further steps had been taken to inform the relevant bodies in the Division of Botany of the International Union of Biological Sciences and the International Union of Biochemistry. It was hoped that in this way molecular biologists and others active in the application of chemical data to systematic problems would be made aware of the work of Commission III.2 and in turn keep the Commission informed of their own interests. The Commission had also, through its Members, started to contact national societies with interests in chemotaxonomy with a view to issuing a directory of such bodies.

The second theme taken up at the Hornbaek meeting in relation to international collaboration was the need to organize an international symposium on chemotaxonomy under the auspices of the Commission (see *Comptes Rendus XXV Conference*, p. 123, item 16). The Commission decided that the symposium should be on the theme *Chemistry in Evolution and Systematics*, including sections on 'Insect-plant Co-evolution', 'Chemistry of Geographical Races', 'Comparative Biosynthetic Pathways', 'Molecular Evolution', and 'Fossil Chemistry'. It was also recommended that there should be 10 plenary speakers and that, if possible, the Symposium should be held at the University of Reading (UK) in September 1971. In the event, however, it proved impossible to organize the meeting in 1971, and the Commission was now planning it for the summer of 1972 in Strasbourg.

The Commission had noted that there was an increasing number of meetings being organized by various national groups with chemotaxonomy as a main or major theme. Often such meetings had international speakers and thus qualified for some IUPAC support. There had been much discussion both at the June meeting and by correspondence as to whether the Commission should be more deeply involved in helping with the planning of, or obtaining sponsorship for, such meetings. However, the Commission decided that although such meetings were extremely welcome and it was hoped an indication that the work of the Commission had been beneficial, it would not be possible for the Commission to take any greater part because of the number involved. Where the scope of such meetings was known to be entirely in accord with the work of the Commission, it was agreed that it might be appropriate for the Commission to send a message of fraternal greetings. This policy was now being further explored.



The second main theme which occupied the Hornbaek meeting was that of publication of and retrieval of information in the field of chemotaxonomy. It was heartening to note that the situation with regard to publication was now in a better state than reported in 1969 (*Comptes Rendus XXV Conference*, p. 122, items 5, 6, and 7). Further issues of the *Annual Index on the Reports on Plant Chemistry* (for 1963 and 1965) were in the press and that for 1964 issued late in 1969. A new editorial board had been established for the *Index* and Dr. NATORI was an active member. It was proposed to prepare future issues directly from the abstract journals which should increase the speed of publication.

Much information on chemotaxonomy was now being abstracted in *Excerpta Botanica* (Section A: Taxonomy) and *Berichte Biochemie und Biologie*. In addition, publication of the *Lynn Index*, a comprehensive bibliography of phytochemistry from 1560 to 1954 collected by the late Prof. E. V. LYNN (Massachusetts College of Pharmacy) had been resumed under the direction of Prof. N. FARNSWORTH (University of Illinois). The latter was also responsible for the organization and publication of *Pharmacognosy Titles*, which abstracted the literature on natural products from the point of view of chemotaxonomy, phytochemistry, biosynthesis, biological activity and methodology. The Commission had commended Prof. FARNSWORTH for his valuable efforts, and hoped that funds would continue to be made available for him to carry on both these publications. The Commission also noted the continued successful publication of *Chemical Plant Taxonomy Newsletter* which was produced jointly by Dr. HARBORNE and Prof. MABRY. At the Hornbaek meeting, the Commission agreed that it might be ideal if the *Newsletter* could be officially sponsored by the Commission, and this question had been taken up with the Organic Chemistry Division Committee.

The Commission was pleased to note that a further volume of Prof. HEGNAUER's *Chemotaxonomie der Pflanzen* (V) was published in late 1969 and that the final volumes (except for one on Leguminosae) should appear early in 1971. (A comprehensive volume on the Phytochemistry of the Leguminosae was being prepared under the editorship of Dr. HARBORNE.) The Commission noted, however, that it was unlikely that supplementary volumes to *Chemotaxonomie der Pflanzen* would be issued and that much further effort would be required to ensure that the firm base which these volumes had given to chemical plant taxonomy was adequately built on.

The Commission was still not satisfied about the standard or ease of publication of papers on chemotaxonomy in primary journals. In the first place, there was the need to speed up publication of short notes reporting the occurrence of known compounds in new sources and to persuade all editors to accept such papers without insisting on too vigorous experimental detail. Even notes published according to the format laid down by the Commission (*Comptes Rendus XXV Conference*, p. 122, item 7; e.g., *Phytochemistry* 9, 2417 (1970) 'Sesquiterpene alkaloids of *Nuphar lutem* subsp. *variegatum*' by C. F. WONG and R. T. LA RONDE) were considered by the Commission to be often over long, and a different format might be desirable. The Commission recommended that the results contained in such reports might be presented in tabular form. This suggestion had been accepted by *Phytochemistry*, and the first collection of papers of this kind should appear early in 1971.

A second major difficulty in publication lay in the fact that an increasing amount of chemotaxonomic research was actually being carried out by botanists and other biologists whose main aim was not directed towards the

chemistry of the products investigated. Such workers rightly felt that chemical and biochemical journals were thus not necessarily the right media for their papers, especially those dealing with subjects like intraspecific variation, hybridisation, phylogeny, *etc.* The Commission agreed that it would be worthwhile investigating this serious problem further and the Secretary had already contacted a number of scientists for their views.

A third problem in publication which the Commission had discussed during the year was that of trivial names of new natural products. The Commission had requested the help of the Commission on Nomenclature of Organic Chemistry (III.1) in this matter.

The final major topic dealt with at the Hornbaek meeting was that of information retrieval. The pilot-scale project carried out by the Kline Science Library, Yale University (*Comptes Rendus XXV Conference*, p. 122, item 6) had shown that there was no easy way to obtain chemosystematic information using existing electronic data systems. The trouble lay in the preparation of abstracts by the existing services. Chemists often did not give the exact specific name of the plants which were examined and, *vice versa*, biologists often only referred to some broad class of substances isolated and these defects were naturally reflected in the abstracts. The Commission had noted, however, that there were now some more broadly based abstracting services being established and further information about their services was being sought.

One unexpected payoff from the Yale project was the finding that Prof. SCOTT and Dr. DEVON of Yale University had prepared a comprehensive card catalogue of new natural products. This index enabled ready reference to be made to the original literature. The Commission was keeping in touch with the project, which might be published by a commercial firm.

The recommendations on the identification and handling of plants used in phytochemical research (*Comptes Rendus XXV Conference*, p. 122, item 9) were also reviewed at Hornbaek, and note was taken of the need to extend the rules to include crude drugs or other materials of plant origin. Prof. TURNER and Dr. SWAIN had accordingly revised these rules (see Appendix to this Report) and they would be sent to the editors of appropriate journals in the near future.

T. SWAIN

### **Appendix—Documentation of Plant Materials**

In all cases where publications contain reference to whole plants or parts therefrom, to crude drugs, or to any other plant material from which identifiable chemical substances have been obtained, they should also include, where at all possible, reference to voucher specimen(s) of the plants or other materials examined. When an adequate specimen is available from which accurate determination could be vouched for by subsequent workers, this should be treated in the usual manner for the preparation of herbarium specimens (flattened, dried, mounted on 20×45 cm sheets with details of collection, place, date and collector). Even when only parts of plants are available (*e.g.*, seeds, bark, roots, *etc.*) adequate specimens should be preserved for the best determination possible. Specimens of all crude drugs should also be kept for future comparison. All specimens should be deposited in a recognized herbarium which contains collections maintained either by the state or by a private institution and which permits the loan of materials for examination. For a guide to herbaria of the world consult *Index Herbariorum* (Regnum Vegetabile 1964, Vol. 31): compiled by J. LANJOUW and F. A. STAFLEU, the International Bureau of Plant Taxonomy and Nomenclature, Utrecht, Netherlands.



## NEW IUPAC NOMENCLATURE RECOMMENDATIONS

One of the main objects of the Union is 'to study topics of international importance to pure and applied chemistry which need regulation, standardization or codification'. Thus, IUPAC has a number of permanent Commissions whose nomenclature recommendations lead to the establishment of their international scientific usage. These recommendations are not made lightly. After long and dedicated work they are published in tentative form, as Appendices to the *Information Bulletin* which are distributed widely on a free-of-charge basis. Following a minimum period of 8 months for the receipt of comments, the recommendations are reviewed by the relevant Commission. If there is no basic disagreement the recommendations, on the approval of the Council, are published in final (definitive) form in the IUPAC journal *Pure and Applied Chemistry*, from which hard-cover reprints are made available.

During the past two years IUPAC final nomenclature recommendations have reached an unprecedented level of activity. In 1970 the Commission on Physicochemical Symbols, Terminology, and Units (I.1) published its new *Manual on Symbols and Terminology for Physicochemical Quantities and Units* [*Pure and Applied Chemistry* 21(1), 1-44 (1970)]. The recommendations presented are generally in agreement with those of the Commission on Symbols, Units, and Nomenclature of IUPAC and Technical Committee 12 of ISO. The present publication supersedes the Commission's publication of 1959 in English and French and its translations into other languages.

As the 'Green Book' of definitive IUPAC nomenclature rules for physical chemistry, the Manual includes recommendations about the names and symbols for physicochemical quantities; a full account of the International System of Units (SI) and of other units; recommendations about numbers and about the algebraic relation of physical quantity, unit, and number; and a list of recommended mathematical symbols. Short chapters are devoted to symbols for chemical elements, nuclides, and particles; symbols for spectroscopy; conventions relating to galvanic cells; pH; and symbols and terminology for rates of reaction. A list of the recommended values of the fundamental constants is given. The body of the Manual is expected to stand for at least ten years. It is planned, however, to attach to it from time to time Appendices on symbols and terminology for more specialized fields of physical chemistry. The first of these—on activities and related quantities—is included in the present volume.

The Commission on Nomenclature of Inorganic Chemistry (II.2) of IUPAC was formed in 1921, and many meetings took place which culminated in the drafting of a comprehensive set of Rules in 1938. On account of the war they were published in 1940 without outside discussion. At the IUPAC meeting in 1947 it was decided to undertake a thorough revision of what had come to be known as the '1940 Rules', and after much discussion they were completely rewritten and issued eventually as *Nomenclature of Inorganic Chemistry 1957*.

Since publication of the 1957 Rules, the Commission on Nomenclature of Inorganic Chemistry has been working continuously to extend its recommendations and more recently on a revision of the earlier document. After due consideration of the various suggestions received following circulation of the tentative recommendations, the manuscript for the second edition of the 'Red Book', *Nomenclature of Inorganic Chemistry*, was finalized and will



shortly be published [provisionally *Pure and Applied Chemistry* 27(1), 1-110 (1971)]. The section on coordination compounds has been much extended reflecting the importance of this field in modern inorganic chemistry. The principle of an alphabetical order of citation of ligands in coordination entities has been adopted, and the rules now make detailed provision for the naming of complexes with unsaturated molecules or groups, the designation of ligand positions in the coordination sphere, the nomenclature of polynuclear compounds and those with metal-metal bonds, and the nomenclature of absolute configurations for six-coordinated complexes based on the octahedron. A short section on boron hydrides and their derivatives has been included. The material which dealt with crystalline phases of variable composition has been revised and extended. There is now a fuller treatment of polyanions.

The first international proposals on the nomenclature of organic chemistry, made at Geneva in 1892, were revised and extended by the Definitive Report of the Commission for the Reform of Nomenclature in Organic Chemistry of the International Union of Chemistry (IUC) which appeared after the meeting at Liège in 1930 (Liège Rules), and was supplemented by less extensive reports from the meetings at Lucerne in 1936 and at Rome in 1938. Although these proposals rendered great service, it was apparent at the meeting of the International Union of Pure and Applied Chemistry at London in 1947 that, in some matters, extension and revision of the nomenclature rules for organic chemistry were required.

The subsequent deliberations of the Commission on Nomenclature of Organic Chemistry (III.1) led eventually to the publication in 1958 of the first part of the 'Blue Book': *Nomenclature of Organic Chemistry, Section A (Hydrocarbons) and Section B (Fundamental Heterocyclic Systems)*. A second edition of Sections A and B appeared in 1966. In 1965, *Section C (Characteristic groups containing Carbon, Hydrogen, Oxygen, Nitrogen, Halogen, Sulfur, Selenium, and/or Tellurium)* was published.

Sections A, B and C are now being brought together under a single cover (about 334 pages). This 'Third Edition' of Sections A and B contains considerable changes from the Second Edition, but these have been confined, in the main, to correction of errors, to clarifications, in a few cases to expansion of existing Rules to cover special cases, and to provision of better or further examples. Major changes are the deletion of the Rules for order of complexity of side chains and of the Stelzner method of naming heterocycles by replacement nomenclature ('a' nomenclature), because it is planned to abandon these procedures in Beilstein's *Handbuch der organischen Chemie* and they have been little used recently elsewhere. Attention is also drawn to new Rules, in accord with principles of the other Rules, for naming heterocyclic ring assemblies, for naming radicals derived from bridged compounds, from spiro compounds, from ring assemblies, and from compounds named by the von Baeyer system. There is also a new Rule, embodying *Ring Index* practice, for naming heterocycles that contain one benzene ring and one hetero ring. The 'Second Edition' of Section C contains a considerable number of changes from the First Edition, but almost all of them are confined to correction of errors, clarification, or provision of better examples. However, one major change has been made, namely, deletion of the rules for order of complexity of substituents.

Copies of the above publications are available from Messrs. Butterworths, 88 Kingsway, London WC2B 6AB, UK.

## ICSU SPECIAL COMMITTEE ON PROBLEMS OF THE ENVIRONMENT

At the XIIth General Assembly of ICSU (Paris, 1968), IUGG and IUBS were invited to form an *ad-hoc* Committee on Problems of Human Environment for the purpose of preparing a report on those characteristics of the environment which man is himself altering. The *ad-hoc* Committee met for the first time in Washington, DC (March, 1969) and held a second meeting in Stockholm (June, 1969). At the suggestion of IUPAC, Prof. R. TRUHAUT and Prof. G. WIDMARK participated in the second meeting as experts in the field of chemistry.

After reporting some 14 ways in which the *ad-hoc* Committee considered man is altering the environment, the following recommendations were made:

1. ICSU should set up a Scientific\* Committee on Problems of the Environment (SCOPE), which would bring together the various disciplines and which, through its Commissions, would be responsible for the promotion of environmental monitoring, evaluation of the effects of environmental disturbances, simulation modelling and predictions, and the study of the social effects of man-made change in the environment.
2. SCOPE should be provided with a secretariat which should be developed into an International Centre for the Environment (ICE).
3. SCOPE and ICE should cooperate fully with other groups outside of ICSU, including all relevant UN Agencies, regional intergovernmental bodies, and international nongovernmental bodies.

The Executive Committee of ICSU at its Xth Meeting (Erevan, 1969) accepted the recommendation to create SCOPE, with a membership of 10 nominated by ICSU, a Chairman designated by the President of ICSU, and 1 member designated by each interested Scientific Union. Dr. W. GALLAY, President of the Applied Chemistry Division, was designated by the Bureau as the official representative of IUPAC to SCOPE. The members nominated by ICSU include Prof. R. TRUHAUT.

Two meetings of SCOPE have so far been held (Madrid 1970, London 1971). A Bureau has been appointed together with Officers:

President	—	Dr. J. E. SMITH (UK)
Vice-President	—	Prof. F. DI CASTRI (Chile)
Secretary	—	Dr. T. F. MALONE (USA)

The number of members designated by ICSU is to be increased by 3 in order to give representation to Africa, India, and South-East Asia. A draft constitution has been discussed. This is similar to that of other ICSU Committees and makes provision for National Adhering Bodies, General Assemblies, etc.

Working Parties and Commissions have so far been set up as follows:

*Working Party 1.* Materials which may significantly affect the biosphere—their determination and biological assessment. Chairman: Dr. W. GALLAY (Canada).

*Working Party 2.* A case study of chlorinated aromatic compounds and their effect on man. Chairman: Prof. C. LEVINthal (USA). An International Registry of Chemical Compounds is also proposed, which will attempt to register such compounds including production statistics.

*Working Party 3.* Scientific basis for management of man-modified ecosystems. Chairman: Prof. G. F. WHITE (USA).

\*Scientific\* was replaced by 'Special' when SCOPE was actually created by ICSU.

*Working Party 4.* Environmental problems in developing countries. Chairman: Prof. F. DI CASTRI (Chile).

*Commission on Monitoring.* Formulation of the scientific basis for a global monitoring system. Chairman: Prof. B. LUNDHOLM (Sweden).

Apart from his Chairmanship of Working Party 1, IUPAC is directly represented on the Commission through the membership of Dr. GALLAY.

Working Party 1 appears to have been the first to convene a meeting (March 1971 in UK). Two distinct aspects of its terms of reference were originally envisaged:

1. Methodology of determination of the materials
2. Toxicological effect of the materials on the living organism

At present this Working Party is restricting itself to the first of these aspects. The members of SCOPE originally assigned to Working Party 1 were Dr. W. GALLAY (Canada), Chairman, together with Dr. K. GRASSHOFF (Germany) and Dr. R. E. MANN (Canada). With the assent of SCOPE, Dr. GALLAY set up a IUPAC Panel of Experts consisting of Dr. H. EGAN (UK), Mr. J. L. MONKMAN (Canada), Prof. R. TRUHAUT (France), Prof. P. W. WEST (USA), and Prof. G. WIDMARK (Sweden). Consideration is being given to a list of pollutants to be studied, media, sampling, analytical approach. Good progress was made at the first meeting and two further ones are contemplated for 1971.

SCOPE has a particular advantage in that it is not governmental, inter-governmental or UN, but a group representing the world scientific community. It draws on every relevant scientific discipline. Mr. MAURICE STRONG, the new Under Secretary of UN for Environmental Affairs, is particularly interested in SCOPE for this reason. The next meeting of SCOPE will begin in Canberra on 30th August 1971. The 1st General Assembly will also be held that week.



## REPORTS OF IUPAC-SPONSORED SYMPOSIA

### INTERNATIONAL SYMPOSIUM ON CHEMISTRY OF NONBENZENOID AROMATIC COMPOUNDS

Sendai, 24-28 August 1970

The Symposium was organized by the Chemical Society of Japan and sponsored by IUPAC and the Science Council of Japan. A total of 296 scientists from 12 countries, accompanied by 25 wives and children, participated.

The scientific programme included 60 contributed research papers and 11 invited lectures on the organic, physical, and theoretical aspects of carbocyclic nonbenzenoid aromatic compounds, novel heteroaromatics, and metal complexes with aromatic character.

Invited lectures delivered at the Symposium were

R. BRESLOW (USA): Quantitative Aspects of Aromaticity and Antiaromaticity.

F. GERSON (Switzerland): ESR Studies of Some Nonbenzenoid Radical Ions

K. HAFNER (Germany): Structure and Reactivity of Polycyclic Cross-conjugated  $\pi$ -Electron Systems

R. HOFFMANN (USA): Theoretical Design of Novel Stabilized Systems

A. W. JOHNSON (UK): Aromaticity in Macrocyclic Polypyrrolic Ring Systems

T. NAKAJIMA (Japan): Ground-state Geometries, Symmetries, and Related Properties of Some Nonalternant Conjugated Hydrocarbons.

T. NOZOE (Japan): Recent Advances in the Chemistry of Troponoids and Related Compounds in Japan

H. PRINZBACH (Germany): Cyclic Cross-conjugated  $\pi$ -Systems

F. SONDHEIMER (UK): Recent Progress in the Annulene Field

E. VOGEL (Germany): Aromatic and Nonaromatic  $14\pi$ -Electron Systems

R. WEST (USA): Cyclic Conjugated Chlorocarbons

The invited lectures will be published in the IUPAC journal *Pure and Applied Chemistry*; summaries of all contributed papers were published in a bound volume *Abstract of Papers*.

The level of invited lectures and contributed papers was extremely high and the Symposium provided a very good opportunity for chemists in this field to meet and to hold discussions. A proposal for a second symposium in this series was enthusiastically approved by the participants. It will be held in 1973.

The social programme included a mixer, a reception, and an excursion to the Matsushima area. A ladies' programme was also organized. The Symposium Chairman and General Secretary were, respectively, Prof. T. NOZOE and Prof. S. ITÔ.

S. ITÔ

### SYMPOSIUM ON CYCLOADDITION REACTIONS

Munich, 7-10 September 1970

The Symposium was organized by the Gesellschaft Deutscher Chemiker and sponsored by IUPAC. The members of the Scientific Committee were: K. GOLLNICK, R. GOMPPER, R. HUISGEN, G. KRESZE, and J. SAUER, Munich. Held at the University of Munich, the Symposium was attended by approximately 350 active members.

The plenary lectures, which will be published in *Pure and Applied Chemistry*, were given by

- P. D. BARTLETT (USA): Some Borderline Cases in Cycloaddition
- H. BESTIAN (Germany): Cycloadditionen mit Sulfonylisocyanaten
- G. M. J. SCHMIDT (Israel): Photodimerisationen in festem Zustand
- N. J. TURRO (USA): Cycloaddition Reactions of Carbonyl Compounds possessing High Energy Content
- P. S. SKELL (USA): Addition Reactions of Free Carbenes
- C. S. FOOTE (USA): Mechanism of Addition of Singlet Oxygen to Olefins and Other Substrates
- G. WILKE (Germany): Cycloadditionen unter dem Einfluss von Übergangsmetallen
- R. B. WOODWARD (USA): Orbital Symmetry Correlations in Cycloadditions

In addition, 52 discussion lectures were presented in two parallel sessions.

The plenary lectures as well as the discussion papers were of a very high level and gave a clear impression about the frontiers of research. It became obvious that the Woodward-Hoffmann rules have made a major impact on the mechanistic concepts of cycloaddition reactions. The symposium offered a splendid—perhaps the first—opportunity for a large group of workers in this actual field to meet and to hold discussions. A brief review of the plenary lectures was published in *Nachrichten aus Chemie und Technik* **18**, 400 (1970).

R. HUISGEN

## INTERNATIONAL CONGRESS ON INDUSTRIAL WASTE WATER

Stockholm, 2-6 November 1970

The Congress was organized by the IUPAC Section for Water, Sewage, and Industrial Wastes in cooperation with the Federation of Swedish Industries, with financial support from IUPAC and the Swedish Board for Technical Development. The programme covered five days with plenary sessions on the first two days and five technical sections running simultaneously on the following three days.

On the first day a session dealt with economics of water pollution abatement in industry and on the second day there were plenary sessions for *Techniques and Methods for Measurement of Flow and Sampling* and for *Waste Water Investigations in Plants*. The technical sessions on the last three days covered waste water problems within the following industrial branches or groups of industries.

1. Chemical industries
2. Food industries
3. Metal industries
4. Pulp and paper industries
5. Miscellaneous industries (Mines, Fermentation industries, Tanneries and Leather finishing plants)

The common theme for the technical sessions was *Measures Taken against Water Pollution in Industry*. Altogether in the Congress were presented 28 main lectures and about 100 other papers.

A total of 724 participants was registered of which about 10% never appeared. An attempt has been made to classify the participants as follows

Persons with an industrial background	69%
Persons from universities and other research institutions	18%

Persons from governmental bodies	9%
Others	4%

A little less than half of the participants were Swedish. Among the others 28 nations were represented.

Preprints of the majority of papers presented, except for the main lectures, were distributed at the Congress. The 28 main lectures will be published in a forthcoming issue of *Pure and Applied Chemistry*. An additional selection of other papers presented at the Congress will be published in a collective form.

The quality of the main lectures was, in general, very good and the quality of other papers presented varied but was generally good, with some peaks. From a quality point of view the best parts of the Congress were the sections dealing with pulp and paper industries, chemical industries, and food industries. It was an advantage that papers and presentations were not on too academic a level, though it had been desirable with still more reports on industrial applications at the sacrifice of research papers. The interest among the Congress participants for the sessions dealing with economics, metal industries, mining, fermentation industries, tanneries and leather finishing plants was rather poor. This was especially notable for the metal industries which ought to take great interest in water pollution abatement.

It was a considerable disadvantage for the discussions at the Congress, that preprints of main lectures, for copyright reasons, could not be distributed to the participants. Thus, the discussions were not as intensive as had been desirable, although plenty of time was available.

The practical arrangements and the organization of the Congress were quite satisfactory.

Although the papers presented did not contain too much essentially new information, it was the opinion of the Section for Water, Sewage, and Industrial Wastes, that a Congress of this kind, concentrated on the practical applications of research and new technology, served a purpose. There is a need for events where the present status of technology for water pollution abatement in industry is summarized and information about the practical experiences made in industry is given. Most other conferences in this field generally try to include a too wide spectrum of subjects in the programme, often covering both the applied and the research side of both industrial and municipal problems.

B. GÖRANSSON

## **INTERNATIONAL SYMPOSIUM ON PESTICIDE TERMINAL RESIDUES**

**Tel Aviv, 17-19 February, 1971**

The Symposium was attended by 285 scientists from abroad and from Israel. Held under the Chairmanship of Dr. H. HURTIG (Canada) and opened by Mr. V. SHEMTOV (Israel Minister of Health), it was divided into five Sections:

I. Organophosphorus Insecticides was under the Chairmanship of E. Y. SPENCER (Canada). It included lectures on terminal residues of O-P insecticides in soil (E. Y. SPENCER), in plants (H. FREHSE, Germany) and in animals (H. O. ESSER, Switzerland). J. MENN (USA) discussed terminal residues of phosphonate insecticides and M. BEROZA (USA) gave a lecture on instrumentation in determination of organophosphorus terminal residues.

II. Organochlorine Insecticides was chaired by F. KORTE (Germany), who gave a paper on the chemical aspects of insecticidal chlorinated hydrocarbons and their behaviour under atmospheric conditions. G. T. BROOKS (UK) summarized the fate of chlorinated hydrocarbons in living organisms. P.



POLEN (USA) who unfortunately was unable to attend, submitted a paper on the fate of insecticidal chlorinated hydrocarbons in storage and processing and F. COULSTON (USA) discussed the occurrence of insecticidal chlorinated hydrocarbons and their breakdown products in man and the resulting toxicological consequences.

III. Carbamate Insecticides was chaired by K. FUKUNAGA (Japan), who presented a paper on metabolism and degradation of carbamate insecticides. H. WYMAN DOROUGH (USA) discussed carbaryl residues in milk and meat of dairy animals. R. L. BARON (USA) presented toxicological considerations of metabolism of carbamate insecticides; R. J. KUHR (USA) discussed the formation and importance of carbamate metabolites as terminal residues and J. MIYAMOTO (Japan) the metabolism of substituted phenyl carbamate insecticides in mammals.

IV. Fungicides was chaired by CH. RESNICK (Israel). H. M. DEKHUIJZON (Netherlands) discussed terminal residues of dithiocarbamate fungicides. M. R. LYMAN (USA) the metabolic fate of dithane M.45. K. OHKUMA (Japan) gave a paper on the chemistry and metabolism of thiophanate fungicides and A. E. SMITH (USA) on the fate of carboxin in soil, plants, and animals. M. ROSE (UK) rounded off the section with a discussion on toxicity of alkyltin fungicides.

V. Herbicides was chaired by P. C. KEARNEY (USA). The metabolism of the phenoxy herbicides was discussed by M. A. LOOS (Republic of South Africa), of phenylurea herbicides by G. VOSS (Switzerland), of s-triazine herbicides by R. H. SHIMABUKURO (USA), and of the acyl anilide herbicides by S. MATANAKA (Japan) whose paper was read by G. ZWEIG (USA). At the end of the session, a special invitation paper on the chemistry of the dioxins—the present status of research—was presented by P. C. KEARNEY.

This Symposium gave the latest information on the chemistry and metabolism of pesticides. All the papers will be published in the IUPAC journal *Pure and Applied Chemistry*.

A. S. TAHORI

## SYMPOSIUM ON ANTIBIOTICS

St. Marguerite/Quebec, 1-3 March 1971

This year the midterm symposium of the newly established Division of Medicinal Chemistry of the Chemical Institute of Canada was held for the first time in collaboration with the Canadian Society of Microbiologists and the Medicinal Chemistry Section of the Organic Chemistry Division of IUPAC.

Held at the Alpine Inn, St. Marguerite, this Symposium had an international flavour. Out of the 121 delegates that participated in the meeting, 11 came from countries other than the North American continent. Countries that were represented were Japan, UK, India, Israel, Italy, Germany, and Tanzania.

Keeping up with the high standards of previous CIC Symposia, the speakers were of international reputation and authorities in their respective fields. Because of the diverse topics discussed, the representation was really heterogeneous—geneticists, biochemists, microbiologists, and chemists—got together to discuss each other's problems and to gain from their experiences.

In discussing the problems and progress in viral chemotherapy Dr. R. F. HAFF (USA) pointed out that present knowledge of viral-specific intracellular events had increased the feasibility of viral chemotherapy. At least in selected

situations diverse chemical classes of agent, such as idoxuridine, methisazone, and amantadine, have been found to be efficacious in the treatment of viral infections in humans. Prophylaxis had been achieved against influenza A<sub>2</sub> virus. Recently, unnatural nucleosides such as Ara-A and Ara-C had been shown to have some antiviral properties. Utility of certain cyclic amines against influenza was under study. Considerable interest had been aroused in the area of interferon and interferon inducers as potential antiviral therapy. Because of serious technical impediments to economic production of interferon, he noted, search for a low molecular weight inducer should be of great interest. Recent observation that *tilorone*, a low molecular weight compound, possessed interferon inducing activity when given orally, might pave the way for further advances in this area. He remarked that past experience in the viral chemotherapy and an increasing knowledge of the mechanisms of viral infections should enable us to chart a more productive future course.

Dr. J. J. Fox (USA) elaborated on an elegant approach for the synthesis of C-substance and Cytosine obtained from the hydrolysis of nucleoside antibiotics Gougerotin and Blasticidin S, respectively. These were cytosine nucleoside antibiotics discovered in Japan, that exhibit certain antiviral property, by inhibiting protein synthesis on the aminoacyl-tRNA-ribosomal level. Although these antibiotics had not found any place in the chemotherapy of viral disease in human, Blasticidin S was used extensively in Japan and other rice-producing countries against rice blast disease caused by *P. oryzae*. A simple synthesis of C-substance should pave the way for the chemical synthesis of a large variety of Gougerotin and Blasticidin-S analogues that might possess interesting biological properties.

Some important biochemical and chemical aspects of C-nucleoside antibiotics were outlined by Dr. K. GERZON (USA). These nucleosides contained ribose bound to a carbon atom of the heterocyclic aglycone instead of nitrogen, and they possessed antiviral properties. As in the case of Blasticidin-S, these C-nucleosides (Formycin C, Showdomycin, etc.) had potential in agriculture because of activity against rice plant diseases. Pyrazomycin, although showing some antiviral property, had limited medical use. He pointed out that preparation of synthetic C-nucleosides or chemical modification of naturally available materials, together with a detailed understanding of structure-activity relationships, hopefully would assist in the realization of the therapeutic potential of this versatile class of agents.

Prof. H. UMEZAWA (Japan) presented an excellent account of work done on determination of partial structure of an important anticancer antibiotic group, Bleomycin. The 8 components of the group were separated and their partial structures determined. On the basis that these antibiotics differed only in the *amine* part of the molecules, Prof. UMEZAWA contended that addition of various other amines in the fermentation medium would give new biosynthetically prepared Bleomycin. This was actually the case—his group prepared 42 artificial Bleomycins by adding different amines during fermentation. This produced the new Bleomycin suppressing the production of natural ones, thus yielding a pure compound. One of the artificial Bleomycins thus produced showed some promise, thus emphasizing the possibilities of biosynthetically produced unnatural antibiotics.

In a similar kind of work, but this time instead of using the whole organism for the preparation of artificial antibiotics, Dr. M. M. DHAR (India) described an elegant synthesis of Echinomycin analogues in a cell-free system. He and his colleagues were able to prepare a cell-free enzyme system(s) that was able to utilize the analogue quinoxaline-4-one-3-acetic acid instead of the natural quinoxaline-2-carboxylic acid to yield the corresponding Echinomycin.



While speaking on the present status of knowledge in the area of biosynthesis of polypeptide antibiotics (Gramicidine S, Tyrocidine) which, unlike other proteins, do not require ribosomes, t-RNA or m-RNA, Prof. E. KATZ (USA) also described and emphasized studies with cell-free systems as well as with intact organisms, biosynthesis of peptide antibiotics where normal constituents were replaced by their analogues. The unnatural D-amino acid components of the peptide antibiotics were biosynthesized by an ATP dependent racemization reaction catalyzed by a component of the multi-enzyme complex.

Dr. J. G. KEIL (USA) dwelt on the exhaustive work done on the degradation of Conmermycin and subsequent transformation of the simpler molecule into many derivatives and their biological properties. Out of hundreds of semi-synthetic derivatives, 3-isobutyramido-4-hydroxy-8-methyl-7-[3-O-(5-methyl-2-pyrrolylcarbonyl) noviosloxy]coumerin (BL-C43) showed interesting *in vivo* and *in vitro* activity and remarkably high oral activity but failed to reach the clinic because of some toxicity encountered during preclinical trials.

Dr. D. J. COOPER (USA) discussed recent advances in the chemistry of aminocyclitol aminoglycosides with special interest in the important group of anti-pseudomonal Gentamycin. He also brought out certain structure-activity relationships among this class of antibiotic. Although the phosphorylating enzyme that usually deactivates this group of antibiotics does not attack the Gentamycin group, the acetylating enzyme acylates Gentamycins and deactivates them. He also indicated the possibility of RTF (resistance transfer factor) for Gentamycins.

Besides chemical modifications of antibiotics giving useful products, the use of microorganisms to transform antibiotics was emphasized by Prof. D. PERLMAN (USA). Microorganisms could bring about a wide variety of changes in a molecule. Although microbial transformation of an antibiotic had with a few exceptions, seldom produced useful products, it might produce useful intermediates for further chemical transformation. He also pointed out the importance of isolation of the enzyme system that was responsible for transformation and its utilization in large-scale preparations.

Dr. H. MAHER (USA) gave a comprehensive review of the chemistry of naturally occurring hydroxamates and hydroxamic acids, some of which possessed antibiotic action. He presented an elaborate discussion in which the identity of iron(III) trihydroxamate Albomycin 82 and antibiotic Ro-5-2667 was established.

Dr. W. D. CELMER (USA) summarized the present status of conformation of macrolide antibiotics. From various physicochemical data conformation of Erythronolide had been established and other 14-membered macrolides had similar conformation. Although the configurational and conformational models for macrolides were still undergoing further refinement, he added, they had proved useful in the study of certain biogenetic and physicochemical theories.

Dr. C. VEZINA (Canada) pointed out that although antibiotics were often associated with medical uses only, about 30-40% of the total production of antibiotics was intended for non-human uses. The important nonmedical uses were in animal production for disease control and growth promotion; in plant protection to control various bacterial and fungal diseases. He also discussed in detail a new, less known application of Antimycin A, in fish management.

Prof. E. P. ABRAHAM (UK) discussed recent developments in the area of biochemistry and biogenesis of Cephalosporin and Penicillins. He presented some evidence that Iso penicillin-N is a possible precursor of benzylpenicillin.



The  $\beta$ -lactam ring opened during the action of  $\beta$ -lactamase, during the inhibition of cell wall synthesis and in the formation of conjugated protein antigens. The products obtained by simple nucleophiles with penicillins and cephalosporins were different. Thus, he suggested, if similar reactions occurred in protein conjugates, antibody combining sites to cephalosporin might differ from those to penicillins.

Dr. P. FRIEDMAN (USA) spoke of work on the mechanism of action of antibiotics that interfered with protein or nucleic acid synthesis. Experiments were designed to interpret the results at molecular level.

Prof. D. SMITH (USA) discussed the growing interest in the area of resistance transfer factor in development of resistance to antibiotics. He emphasized the work done on the genetic and biochemical properties of the R factors.

S. RAKHIT

# FORTHCOMING IUPAC-SPONSORED SYMPOSIA

## Vth INTERNATIONAL CONFERENCE ON ORGANOMETALLIC CHEMISTRY

Moscow, 16-21 August 1971

The Conference is sponsored by the Academy of Sciences of USSR and by IUPAC. The sessions will take place in the buildings of the Lomonosov Moscow State University on the Lenin Hills.

### Scientific Programme

The Organizing Committee wishes to restrict the types of compound to be discussed to organometallic derivatives of transition and nontransition metals, organoboron compounds (especially those of carborane type) and also to silicon and phosphorous compounds having carbon—element—metal bond.

Attention will be preferably concentrated on the following problems in the chemistry of the compounds given above:

1. The structure and reactivity of organomagnesium compounds and their analogues, the development of Grignard reaction (in connection with the 100th anniversary of his birth).
2. New reactions and their mechanisms. New types of organometallic compound and their physicochemical properties.
3. Electronic effects in reactions and physicochemical properties of organometallic compounds.
4. The role of the metal atom in reactions of organometallic compounds.
5. Reactions of coordinated organic ligands.
6. Stereochemical problems in organometallic chemistry.
7. Clusters and polymetallic organometallic compounds.
8. Reactivity problems of the carbon—element bond ( $\sigma$ - $\pi$ -transformations).
9. Reactions of organometallic compounds induced by radiation.

Papers are welcomed which deal with practical applications of organometallic compounds, their use as homogeneous catalysts as well as studies of the role of organometallic compounds in biological processes.

### Plenary and Discussion Lectures

- |   |  |
|---|--|
| M. R. CHURCHILL (USA)                   | Structural Studies on Some Organotransition-metal Complexes  |
| G. COSTA (Italy)                        | Effect of Nature of Ligands and their Molecular and Electronic Structure on Reactivity of the Metal-Carbon Bond in Cobalt Chelates |
| E. O. FISCHER (Federal German Republic) | Recent Aspects of Transition Metal Carbonyl Carbene Complexes (plenary lecture)  |
| M. L. H. GREEN (UK)                     | Aspects of Organic Chemistry of Molybdenum and Tungsten  |
| I. F. LUTZENKO (USSR)                   | O- and C-isomeric Organoelement Derivatives of Ketoenol Systems, their Rearrangements and Elementotropy                            |
| P. M. MAITLIS (Canada)                  | Metal-catalyzed Oligomerization of Acetylenes  |
| J. NASIELSKI (Belgium)                  | Pentacoordination as the Basis of Organotin Chemistry  |

H. NORMANT (France)	Chemistry of Organomagnesium in France after Grignard (plenary lecture)
R. OKAWARA (Japan)	Some Recent Advances in Organometallic Chemistry of Thallium(III)
S. PASYNKIEWICZ (Poland)	Reactions of Organoaluminium Compounds with Electron Donors
M. D. RAUSCH (USA)	Recent Studies in Metal-Cyclopentadienyl and Metal-Arene Chemistry
G. N. SCHRAUZER (USA)	Recent Advances in Organocobalt Chemistry
F. G. A. STONE (UK)	Synthesis of Organo-Transition metal Compounds by Oxidative-addition and Related Reactions (plenary lecture)
K. H. THIELE (German Democratic Republic)	Contributions to Alkylation of Transition Metal Halides
L. J. TODD (USA)	Carbon-13 NMR of Some Organometallic Compounds
T. G. TRAYLOR (USA)	Some Studies on the Nature of $\sigma$ — $\pi$ Conjugation
M. E. VOLPIN (USSR)	Organometallic Compounds in Homogeneous Catalysis (plenary lecture)
G. WILKINSON (UK)	Aspects of $\sigma$ -Bonding in Organometallic Compounds
G. J. M. VAN DER KERK (Netherlands)	Organozinc Coordination Chemistry and Catalytic Effects of Organozinc Coordination Compounds

The plenary and discussion lectures will subsequently be published in the IUPAC journal *Pure and Applied Chemistry*.

### Conference Languages

The official languages will be Russian and English. Scientific papers may be presented in any language, but it is desirable that the language be understandable to the majority of the participants. Simultaneous translation will be provided only from Russian into English and *vice versa*. The Conference literature will be published in Russian and in English.

### Secretariat

All correspondence should be directed to:

Organizing Committee, Vth International  
Conference on Organometallic Chemistry  
Institute of Organo-Element Compounds  
Academy of Sciences of USSR  
Ul. Vavilova 28, Moscow V-312  
USSR  
(Telephone: 135-93-48)

## IVth INTERNATIONAL SYMPOSIUM ON MAGNETIC RESONANCE

Rehovot, 24-31 August 1971

Sponsored by the International Society of Magnetic Resonance, IUPAC, and the Israel Academy of Sciences and Humanities, the Symposium will celebrate the twenty-fifth anniversary of nuclear magnetic resonance. The meetings will



be held at the Weizmann Institute of Science, Rehovot, and the Hebrew University, Jerusalem.

### Programme

The programme will be devoted to basic nuclear magnetic resonance and its applications to physics, chemistry, and biology. The following topics will also be discussed:

- Electron Spin Resonance
- Quadrupole Resonance
- Cyclotron Resonance
- Ferromagnetic Resonance
- Acoustic Magnetic Resonance

It will consist of morning and afternoon sessions. Each session will begin with an opening lecture followed by contributed papers and discussion.

### Invited Speakers

These include:

F. BLOCH (USA)	E. M. PURCELL (USA)
S. ALEXANDER (Israel)	W. A. ANDERSON (USA)
E. R. ANDREW (UK)	J. D. BALDESCHWIELER (USA)
E. D. BECKER (USA)	G. J. BÉNÉ (Switzerland)
H. J. BERNSTEIN (Canada)	R. BLINC (Yugoslavia)
A. D. BUCKINGHAM (UK)	M. COHN (USA)
P. DIEHL (Switzerland)	H. FISCHER (Switzerland)
S. FUJIWARA (Japan)	R. M. GOLDING (Australia)
H. S. GUTOWSKY (USA)	E. L. HAHN (USA)
K. HAUSER (Germany)	G. HERTZ (Germany)
D. J. E. INGRAM (UK)	J. J. KATZ (USA)
D. KIVELSON (USA)	M. KLEIN (USA)
W. D. KNIGHT (USA)	G. LAUKIEN (Germany)
C. MACLEAN (Netherlands)	S. MEIBOOM (USA)
W. D. PHILLIPS (USA)	L. W. REEVES (Canada)
R. G. SHULMAN (USA)	C. P. SLICHTER (USA)
K. VENKATARAMAN (India)	J. S. WAUGH (USA)
M. WEGER (Israel)	D. ZAMIR (Israel)

The invited lectures will subsequently be published in the IUPAC journal *Pure and Applied Chemistry*.

### Language

The language of the Symposium will be English. Contributions in other languages will be accepted but no simultaneous translation will be provided.

### Secretariat

Executive Committee, IVth International  
Symposium on Magnetic Resonance  
Weizmann Institute of Science  
Rehovot  
Israel

## VIII IUPAC MICROSYMPOSIUM ON MACROMOLECULES: POLYMER MORPHOLOGY

Prague, 30 August-2 September 1971

### Topics

Formation of Supermolecular Structures in Solutions, Melts, and Polymerizing Systems  
Morphology of Single Crystals, Spherulites, and Oriented Crystallized Polymers  
Morphology of Amorphous Homopolymers, Copolymers, and Polymeric Mixtures  
Morphological Changes Caused by Physical and Chemical Treatment  
Effect of Morphology on Physical Properties of Polymers

### Main Lectures

E. H. ANDREWS (UK)	Influence of Morphology on Mechanical Properties of Crystalline Polymers
N. F. BAKEEY (USSR)	(title not yet available)
E. W. FISCHER (Germany)	Effect of Annealing and Temperature on Morphological Structure of Polymers
A. KELLER (UK)	Some New Methods and Results in Study of Crystal Morphology in Polymers
A. NAKAJIMA (Japan)	Influence of Crystallization Conditions on Single Crystal Formation
B. WUNDERLICH (USA)	Extended Chain Crystals of Linear High Polymers
G. S. Y. YEH (USA)	Morphology of Amorphous Polymers and Effects of Thermal and Mechanical Treatments on the Morphology

## IX IUPAC MICROSYMPOSIUM ON MACROMOLECULES: THERMODYNAMICS OF INTERACTIONS IN POLYMER SOLUTIONS

Prague, 6-9 September 1971

### Topics

Interactions Arising from Difference in Size and Shape of Polymer and Solvent Molecules  
Solvation of the Macromolecule by Specific Interactions  
Hydrophobic Bonds and Clustering in the System Polymer—Low-Molecular Weight Compounds  
Interactions in Dilute Polymer Solutions

### Main Lectures

P. J. FLORY (USA)	Opening Lecture
E. F. CASASSA (USA)	Thermodynamic Interactions in Dilute Polymer Solutions: A Survey of Current Ideas
M. L. HUGGINS (USA)	Thermodynamic Properties of Polymer Solutions: Dependence on Molecular Properties
J. L. LUNDBERG (USA)	Molecular Clustering and Segregation in Systems of Polymers and Low-Molecular Weight Compounds

J. NÉEL (France)	Experimental Study (IR and NMR) of Influence of Specific Intramolecular Interactions on Conformation of Model Molecules (with Special Reference to Peptides and Oligopeptides)
D. PATTERSON (Canada)	Role of Free Volume in Polymer Solution Thermodynamics
O. B. PTITSYN (USSR)	Thermodynamic Parameters of Helix-Coil Transitions in Polypeptide Chains
H. YAMAKAWA (Japan)	(title not yet available)

### **Microsymposia Secretariat**

All correspondence should be directed to:

PMM Secretariat  
Institute of Macromolecular Chemistry  
Czechoslovak Academy of Sciences  
Petržiny 1888, Prague 6  
Czechoslovakia

The main lectures from both Microsymposia will subsequently be published in the IUPAC journal *Pure and Applied Chemistry*.

## **1st INTERNATIONAL SYMPOSIUM ON ADVANCES IN MICROBIAL ENGINEERING**

**Marienbad, 6-10 September 1971**

The Symposium is sponsored by the Fermentation Industries Section of IUPAC, the International Organization of Biotechnology and Bioengineering, the Economic and Applied Microbiology Section of the International Association of Microbiological Societies, and the UNESCO-ICRO Panel of Applied Microbiology. It is being organized by the Microbiological Institute of the Czechoslovak Academy of Sciences and the Chemical Engineering Group of the Czechoslovak Chemical Society at Marienbad (Mariánské Lázně), a pleasant health resort in West Bohemia.

### **Scope**

The scope of the Symposium is to review for the first time on an international basis that part of research involved in engineering investigations of processes which are essentially microbiological. Five scientific sessions are planned:

Growth kinetics  
Product formation kinetics  
Fermenter design fundamentals  
Fermenter operation and control  
Other operations in microbial engineering

Ample time is reserved for discussions, because the Organizers feel it to be rather important in this new and still formulating scientific field. The term microbial engineering was chosen to represent that part of the broader branch which is generally termed *bioengineering*, to distinguish processes which involve engineering aspects of production of and by microorganisms from processes involving medical or food applications.

Apart from scientific sessions where original papers and shorter communications on the above-listed subjects will be presented, three panel discussions are planned in separate sessions:

Single cell protein production  
Quo vadis, bioengineering  
Education in biochemical engineering—present status and future



### Invited Lectures

- |   |  |
|---|--|
| E. L. GADEN, JR. (USA)                                    | Development and Practical Application of Microbial Process Kinetics  |
| E. O. POWELL (UK)   | Hypertrophic Growth  |
| G. TERUI, M. OKAZAKI, A. SHINMYO and S. KINOSHITA (Japan) | Kinetics of Enzyme Production by Microbes  |
| V. L. YAROVENKO and B. M. NAKHMANOVICH (USSR)             | Kinetics of Product Synthesis in Continuous Alcohol Fermentation   |
| N. BLAKEBOROUGH (UK)                                      | Fundamentals of Fermentor Design   |
| Z. ŠTĚRBÁČEK and M. SÁCHOVÁ (Czechoslovakia)              | Prediction of Degree of Backmixing in Quasi-plug Flow Systems based on Axial Dispersed Plug Flow Model and Time Finite Tracer Data |
| A. E. HUMPHREY (USA)                                      | Problems of Scale-up and Translation of Antibiotic Screens to Plant Equipment  |
| B. ATKINSON and I. J. DAVIES (UK)                         | The Completely Mixed Microbial Film Fermentor—A Method of Overcoming Wash-out in Continuous Fermentation                           |
| Z. L. LENGYEL (Hungary)                                   | Controlled Aeration of Fermentation Systems  |
| V. H. EDWARDS (USA)                                       | Tailored Adsorbents for Chromatographic Purification of Enzymes and Other Biological Materials                                     |
| L. EDEBO (Sweden)   | Disintegration of Cells and Protein Recovery   |
- The invited lectures will subsequently be published in the IUPAC journal *Pure and Applied Chemistry*.

### Symposium Language

The only symposium language is English. No provisions are being made for translation of papers into any other language.

### Secretariat

All correspondence should be addressed to:

Dr. Z. ŠTĚRBÁČEK, Executive Secretary  
Symposium on Advances in Microbial Engineering  
Institute of Microbiology  
Czechoslovak Academy of Sciences  
Budějovická 1083, Praha 4-Krč  
Czechoslovakia

### VIIIth INTERNATIONAL SYMPOSIUM ON CHEMISTRY OF NATURAL PRODUCTS

**New Delhi, 6-12 February 1972**

The inaugural meeting will be held at Vigyan Bhawan and the subsequent meetings in the buildings of the Indian National Science Academy and the nearby buildings of the Indian Medical Association and the Institution of Engineers.

### Plenary Lectures

There will be ten plenary lectures by distinguished scientists. These lectures will be published in *Pure and Applied Chemistry*, the official journal of IUPAC.

## Contributed Papers

The Scientific Programme Committee will consider papers of special interest and novelty in any branch of natural products chemistry. However, the Symposium will be devoted mainly to the following topics for which it is proposed to organize separate sections:

- Alkaloids
- Polyphenolics
- Terpenoids and Steroids
- Macromolecules of Biological Interest (Proteins, Peptides, Nucleic Acids, *etc.*)
- Carbohydrates, Lipids, and Related Substances
- Other Topics in Natural Products Chemistry including Physical Methods of Structure Determination

Applications to contribute a paper, accompanied by an abstract, must reach the Secretary not later than 1st September 1971.

## Symposium Language

The official language of the Symposium will be English. Contributed papers may be presented in any language but the Organizers suggest that speakers should, as far as possible, use English that is commonly understood by most participants; no arrangements will be made for simultaneous translation. The Symposium literature will be published in English.

## Pre- and/or Post-Symposia

Provisional plans have been made to arrange two or three pre- and/or post-Symposia of restricted scope, with a limited number of participants. Details will be announced later.

## Correspondence

Correspondence relating to the meetings should be addressed to:

Prof. S. RANGASWAMI, Symposium Committee Secretary  
VIIIth International Symposium on  
Chemistry of Natural Products  
Indian National Science Academy  
Bahadur Shah Zafar Marg  
New Delhi-1  
India

## IIIrd INTERNATIONAL SYMPOSIUM ON CAROTENOIDS OTHER THAN VITAMIN A Cluj, 4-7 September 1972

The Organizing Committee has obtained the sponsorship of the Romanian Ministry of Education, the Academy of the Socialist Republic of Romania, and of IUPAC for the Symposium.

The tentative scientific programme includes six plenary lectures on modern studies about carotenoids. The lecturers will be: B. H. DAVIES (UK), T. W. GOODWIN (UK), S. LIAAEN JENSEN (Norway), D. I. SAPOZHNIKOV (USSR), B. C. L. WEEDON (UK), O. B. WEEKS (USA).

Topics for contributed papers may be studies on structures, physical and chemical properties, and biochemistry of carotenoids.

## Secretariat

All correspondence should be directed to:

Prof. C. BODEA  
Department of Biochemistry  
Institute of Agronomy  
Str. Mănăştur 3  
Cluj, Romania

## VIIth INTERNATIONAL SYMPOSIUM ON REACTIVITY OF SOLIDS

**Bristol, 17-21 September 1972**

The first International Symposium on the Reactivity of Solids was held in Paris in 1948. Since then it has become an established tradition to hold a conference in the series every four years—at Gothenburg (1952), Madrid (1956), Amsterdam (1960), Munich (1964), and Schenectady (1968). These meetings have been held under the auspices of IUPAC.

The International Committee has approved Bristol as the venue for the 1972 Symposium. Principal sponsor will be The Chemical Society (London) in association with the Institute of Metals and the British Ceramic Society. The Symposium is intended to be interdisciplinary in nature and should be of interest to solid-state chemists and physicists, metallurgists, ceramists, chemical engineers, and materials scientists.

## Theme

The broad aim of this meeting is to discuss the mechanisms of solid-state reactions in the light of the developing knowledge of microstructure in solids. Special emphasis will be placed on techniques of direct observation. Transport and diffusion phenomena will be considered relevant in so far as they are precursor processes which lead to reaction in a solid. An attempt will be made to relate fundamental aspects of the subject to reactions which are important in the industrial context.

## Topics

Contributions will fall under one of the following six subject headings:

Gross Departures from Stoichiometry and Order in Crystals (*e.g.*, the role of extended defects; shear structures; mechanism of formation and kinetic aspects)

Reaction Processes in Bulk Solids, as studied by experimental techniques which throw light upon fundamental mechanisms (*e.g.*, optical and electron microscopy, microprobe methods, resonance techniques; their application to thermal decompositions, phase transformations, *etc.*)

Reactions in the Organic Solid State—

(a) Polymerization in the Solid State

(b) Microstructure and Nucleation in Polymers

(c) High Temperature Degradation of Polymers and Polymeric Fibres

Reactions at Solid Surfaces with particular emphasis on the structure of the interface between reactant and product. This excludes simple chemisorption and catalytic reactions but includes processes which are precursors of bulk phase reactions (*e.g.*, corrosion and nucleation)

Reactions in Vitreous and Amorphous Solids



Solid-state Reactions in Technology (*e.g.*, preparation of compound oxides, ceramic microstructures, graphitization phenomena, role of particle texture in solid-state reactions, extractive metallurgy). It is intended that papers in this section will not be limited to specific experimental investigations; rather, they will seek broadly to discuss technological problems of general interest in terms of first principles.

### **Language**

With the agreement of the International Committee it has been decided that the official conference language will be English and a working knowledge of this language will be assumed. Oral presentation of papers and discussion may be in a speaker's language of choice. No simultaneous translation will be provided, but interpreter facilities will be available.

### **Correspondence**

All correspondence should be directed to:

Dr. R. M. DELL, Executive Secretary  
VIIIth International Symposium  
on Reactivity of Solids  
Atomic Energy Research Establishment  
Harwell, Didcot  
Berkshire, UK

# ASSOCIATED ORGANIZATIONS OF IUPAC

## VIIIth INTERNATIONAL CONGRESS ON CLINICAL CHEMISTRY

Copenhagen, 19-23 June 1972

At the invitation of the Scandinavian Society for Clinical Chemistry and Clinical Physiology, the Congress will be held at Bella Centret, which is the largest congress and exhibition centre in Scandinavia. It is sponsored by the International Federation of Clinical Chemistry (an Associated Organization of IUPAC) and organized by the Danish Society for Clinical Chemistry and Clinical Physiology.

### Preliminary Scientific Programme

#### *A. Metabolic and Clinical Aspects*

Plasma protein patterns as a diagnostic aid  
Proteins in urine  
Plasma lipid patterns as a diagnostic aid  
Metabolism of phosphate  
Molecular mechanisms of coagulation and fibrinolysis  
Biochemical adaptation to hypoxia  
Deficiencies of vitamin B<sub>12</sub> and folate  
Chemical parameters in differential diagnosis of hypertension  
Metabolic changes during long term haemodialysis  
Screening for inborn errors of metabolism  
Metabolic changes during administration of contraceptive drugs

#### *B. Chemical and Technical Aspects*

Quality requirements for enzyme and antibody reference preparations ('standards')  
Quality requirements for enzymes and antibodies as reagents  
So-called qualitative tests: sensitivity and quality control  
Determination of drugs and their metabolites  
Radioimmunoassays  
Electronic data processing: requisition, storage, and presentation of results  
Quality requirements for automated equipment  
Problems in microanalysis  
Application of mass spectrometry in clinical chemistry  
Developments in application of electrodes

#### *C. General Aspects*

Quality control  
Reference values ('normal values')  
Pattern recognition, multivariate analysis, and taxonomy  
The role of clinical chemistry in health screening

**Symposia or panel discussions** concerning the various items will be organized. Experts will be invited to contribute **reviews** on developments over the last few years. **Free communications** will be accepted within the space and time limits.

Facilities for showing **scientific films** and for a **scientific exhibition** will be available. Simultaneous translation will not be arranged. The use of the English language in communications is encouraged.

### **Secretariat**

All correspondence should be sent to:

VIIIth International Congress on  
Clinical Chemistry  
Department of Clinical Chemistry  
Rigshospitalet, Blegdamsvej 9  
DK-2100 Copenhagen Ø, Denmark  
(Telephone: (01) 35 83 88  
Telegraphic address: OCTACLEM  
Copenhagen, Denmark)



## ACTIVITIES OF OTHER INTERNATIONAL UNIONS

### IXth GENERAL ASSEMBLY AND INTERNATIONAL CONGRESS OF INTERNATIONAL UNION OF CRYSTALLOGRAPHY

Kyoto, 27 August-7 September 1972

By invitation of the Science Council of Japan the meetings will be held in the Kyoto International Conference Hall.

The arrangement of the scientific programme will be mainly similar to that adopted for the VIIIth Congress held in USA in 1969. Scientific sessions will be composed of Frontier Topics, Open Sessions of Commissions of the Union, and *ad-hoc* Meetings. Abstracts of the contributed papers on subjects covering a wide range of crystallography are invited. Accepted abstracts will be printed in an Abstracts Book of the Congress. Acceptance of an abstract will not imply that the corresponding paper can be presented at the Congress. The *ad-hoc* Meetings will be arranged with the intention of encouraging free discussion as well as the presentation of papers.

Unlike the previous Congress, neither Symposia nor Topical Meetings will be planned before or after the Congress. However, some of the Frontier Topics will receive specific emphasis.

Enquiries should be addressed to:

Prof. Y. SAITO, Executive Secretary  
Japanese Organizing Committee  
IXth IUCr Congress  
Institute for Solid State Physics  
University of Tokyo  
Roppongi-7, Minato-ku  
Tokyo 106, Japan

## SPECIAL PUBLICATIONS

### STABILITY CONSTANTS OF METAL-ION COMPLEXES

By L. G. Sillen and A. E. Martell

In 1964 The Chemical Society (London) published, in agreement with IUPAC, a substantial compilation of stability constants of metal-ion complexes, that had been prepared by Profs. Sillén and Martell under the auspices of the Commission on Equilibrium Data of the Analytical Chemistry Division of IUPAC. A supplement to that compilation has now been published, again in agreement with IUPAC, in which data for the years 1963-1968 have been tabulated by the same editors operating under the same auspices.

The two volumes represent a unique compilation, produced by international cooperation, and of incalculable value to coordination chemists. Together they form a fitting memorial to LARS GUNNAR SILLÉN, who died before the supplement appeared, having devoted some 17 years to the compilation.

A few copies of the main volume (CS Special Publn. No. 17) are still available. Technical details:

*Stability Constants* (Special Publn. No. 17): cloth bound  
Size 25×18 cm                      Pages xvii+754  
Price £8 (US \$20) post free

*Stability Constants*, Supplement No. 1  
(Special Publn. No. 25): cloth bound  
Size 25×18 cm                      Pages xxii+860  
Price £20 (US \$50) post free

Enquiries, orders and remittances should be addressed to:

Publications Sales Officer  
The Chemical Society  
Blackhorse Road  
Letchworth  
Hertfordshire SG6 1HN, UK

### INTERNATIONAL COMPENDIUM OF NUMERICAL DATA PROJECTS

The Committee on Data for Science and Technology (CODATA) was established in 1966 by the International Council of Scientific Unions (ICSU) for the purpose of stimulating and coordinating worldwide activities on the compilation and critical evaluation of numerical property data. The principal functions of CODATA are to recommend and encourage data compilation and evaluation work where required, to suggest coordination between data centres and projects where duplication or overlap exist, to develop higher standards of presentation and evaluation, and to improve the quality and promote the distribution of the publications and services of the data centres.

In addition to encouraging the production of critically selected or evaluated data, a primary aim of CODATA is to promote their use by the scientific and technical community, which leads to significant improvement in the quality of scientific research, and to efficiency and economy in industry.

For these reasons, the *International Compendium of Numerical Data Projects* has been produced. It is the first comprehensive worldwide survey and analysis of centres which compile, evaluate, and publish numerical

property data for science and technology. The organization and substance-property coverage of the data centres and projects are described in detail, and their services and publications are listed and reviewed. The Compendium is arranged according to six broad property categories: nuclear; atomic and molecular, including spectroscopy; solid state, including crystallographic, mineralogical, and electrical and magnetic; thermodynamic, including transport, thermophysical, and solution; chemical kinetics; and other properties, including gas chromatographic and optical. An extensive listing of handbooks is given which covers the bio- and earth sciences and analytical chemistry, in addition to the above property categories. Sources of internationally approved units, symbols, constants, and nomenclature are detailed, and author, subject, country, and international projects-International Unions indexes are provided. The Compendium is a valuable reference source both for the compiler, evaluator, and programme manager who must know what compilations and activities exist so that future work may be planned effectively, and particularly for the working scientist, technologist, and engineer, who is guided to the source of the numerical data essential for his research and calculations.

Technical details:

1969, XXIII + 295 pages. Title No. 1611  
DM 48,—; US \$13.20; £5.50

Orders should be addressed to:

Lange & Springer  
Heidelberger Platz 3  
D-1000 Berlin 33  
Germany

## APPENDICES TO INFORMATION BULLETIN

The following Technical Reports, the first in a new series of Appendices to the IUPAC *Information Bulletin*, have just been issued:

- No. 1—Collaborative Study of a Method for Determination of Concentration and Purity of Aflatoxin Standards and Use of the Method for Measuring Stability of the Standards
- No. 2—Minimum Specifications for Seven Extraction Solvents used in Food Processing
- No. 3—Worldwide Survey of Fermentation Industries, 1967

Gratis copies may be obtained by writing to:

The Assistant Secretary (Publications)  
IUPAC Secretariat  
Bank Court Chambers  
2-3 Pound Way  
Cowley Centre  
Oxford OX4 3YF, UK



## COLLEAGUES DECEASED SINCE XXVth IUPAC CONFERENCE

<i>Australia</i>	Dr. W. E. COHEN (22nd September 1969)—Section on Pulp, Paper, and Board
<i>Austria</i>	Prof. G. GORBACH (17th March 1970)—Section on Oils and Fats
<i>Brazil</i>	Prof. F. FEIGL (26th January 1971)—Formerly in Analytical Chemistry Division
<i>Denmark</i>	Dr. K. HELHOLT (10th October 1970)—Formerly in Section on Oils and Fats
<i>Germany</i>	Prof. F. WEYGAND (18th September 1969)—Bureau
<i>Hungary</i>	Prof. L. ERDEY (22nd February 1970)—Analytical Chemistry Division Committee
<i>Italy</i>	Prof. G. CENTOLA (25th October 1970)—Section on Pulp, Paper, and Board
<i>Netherlands</i>	Prof. J. H. DE BOER (26th April 1971)—Past President of Inorganic Chemistry Division
<i>New Zealand</i>	Prof. J. PACKER (24th February 1971)—New Zealand National Committee for Chemistry
<i>Sweden</i>	Prof. L. G. SILLÉN (23rd June 1970)—Commissions on Physicochemical Symbols, Terminology, and Units, and Equilibrium Data
<i>Switzerland</i>	Prof. A. STOLL (13th January 1971)—Past President of IUPAC Dr. W. SCHÖNIGER (23rd February 1971)—Commission on Microchemical Techniques and Trace Analysis
<i>USA</i>	Dr. E. COTLOVE (13th September 1970)—Commission on Automation in Clinical Chemistry
<i>USSR</i>	Prof. V. KARGIN (21st October 1969)—Macromolecular Division Committee Prof. M. M. SHEMYAKIN (26th June 1970)—Organic Chemistry Division Committee Prof. S. S. MEDVEDEV (13th August 1970)—Macromolecular Division Committee

# CALENDAR OF IUPAC-SPONSORED MEETINGS

1971

June 14-17	International Symposium on Identification and Measurement of Environmental Pollutants (Mr. M. K. WARD, Executive Secretary, International Symposium on Identification and Measurement of Environmental Pollutants, c/o National Research Council of Canada, Ottawa 7, Ontario, Canada)	Ottawa (Canada)
June 21-25	International Meeting on Boron Compounds (J. PLESEK, Institute of Inorganic Syntheses, Czechoslovak Academy of Sciences, Rez near Praha, Czechoslovakia)	Liblice (Czechoslovakia)
June 22-24	Conference on Chemical Transformations of Polymers (Dr. M. LAZAR, Polymer Institute, Slovak Academy of Sciences, Dubravská Cesta, Bratislava, Czechoslovakia)	Bratislava (Czechoslovakia)
July 5-9	IIIrd International Congress on Crystal Growth (Secretariat ICCG-3, Laboratoire des Mécanismes de la Croissance cristalline, Faculté des Sciences de Marseille, St-Jérôme, F-13 Marseille 13 <sup>e</sup> , France)	Marseille (France)
July 12-14	IInd International Calorimetry Conference (Dr. S. GUNN, University of California Radiation Laboratory, Livermore, California 94550, USA)	Orono, Maine (USA)
July 12-16	IIIrd Society for Analytical Chemistry Conference (Mr. F. C. SHENTON, County Analyst's Department, County Hall, Durham, UK)	Durham (UK)
July 15-24	XXVIth International Conference of Pure and Applied Chemistry (Executive Secretary, IUPAC Secretariat, Bank Court Chambers, 2/3 Pound Way, Cowley Centre, Oxford OX4 3YF, UK)	Washington, DC (USA)
July 25-30	XXIIIrd International Congress of Pure and Applied Chemistry (Mr. A. T. WINSTEAD, American Chemical Society, 1155 Sixteenth Street NW, Washington, DC 20036, USA)	Boston (USA)
August 16-21	Vth International Conference on Organometallic Chemistry (Organizing Committee, Vth International Conference on Organometallic Chemistry, Institute of Organo-Element Compounds, Academy of Sciences of USSR, Ul. Vavilova 28, Moscow B-312, USSR)	Moscow (USSR)
August 24-31	IVth International Symposium on Magnetic Resonance (Dr. D. FIAT, Chairman of Organizing Committee, IVth International Symposium on Magnetic Resonance, c/o Weizmann Institute of Science, Rehovot, Israel)	Rehovot Jerusalem (Israel)
August 30- September 2	VIIIth Prague IUPAC Microsymposium on Macromolecules: Polymer Morphology (Microsymposium Secretariat, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Petřiny 1888, Praha 6, Czechoslovakia)	Prague (Czechoslovakia)
August 30- September 3	International Symposium on Chemical Education (Prof. E. GIESBRECHT, Instituto de Química, Universidade de São Paulo, Caixa Postal 8105, São Paulo, Brazil)	Sao Paulo (Brazil)

September 6-9	IXth Prague IUPAC Microsymposium on Macromolecules: Thermodynamics of Interactions in Polymer Solutions (Microsymposium Secretariat, Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, Petřiny 1888, Praha 6, Czechoslovakia)	Prague (Czechoslovakia)
September 6-10	Ist International Symposium on Advances in Microbial Engineering (Dr. Z. ŠTĚRBÁČEK, Secretary of Organizing Committee, Symposium on Advances in Microbial Engineering, c/o Institute of Microbiology, Czechoslovak Academy of Sciences, Budějovická 1083, Praha 4-Krč, Czechoslovakia)	Marienbad (Czechoslovakia)
September 22-26	IIIrd National Conference on Analytical Chemistry (Dr. C. LUCA, Secretary of Organizing Committee, IIIrd National Conference on Analytical Chemistry, c/o National Council of Engineers and Technicians, Calea Victoriei 118, Bucharest, Romania)	Brasov (Romania)
1972		
February 6-12	VIIIth International Symposium on Chemistry of Natural Products (Prof. S. RANGASWAMI, Indian National Science Academy, Bahadur Shah Zafar Marg, New Delhi-1, India)	New Delhi (India)
April 3-7	International Congress on Analytical Chemistry (Organizing Committee, International Congress on Analytical Chemistry, Kyoto International Conference Hall, Takaraike, Sakyo-ku, Kyoto, Japan)	Kyoto (Japan)
June 5-8	IUPAC-EUCEPA Symposium on Man-made Polymers in Papermaking (Mr. L. NEIMO, Executive Secretary, IUPAC-EUCEPA Symposium on Man-made Polymers in Papermaking, c/o Finnish Pulp and Paper Research Institute, POB 10136, Helsinki, Finland)	Helsinki (Finland)
June 10-15	Microsymposium on Photochemical Processes in Polymer Chemistry (Prof. G. SMETS, Laboratoire de Chimie macromoléculaire, Université de Louvain, Celestijnenlaan 200 F, B-3030 Heverlee, Belgium)	Louvain (Belgium)
July 3-8	Symposium on Chemistry in Evolution and Systematics (Dr. J. B. HARBORNE, Secretary of Organizing Committee, Symposium on Chemistry in Evolution and Systematics, c/o Phytochemical Unit, Department of Botany, University of Reading, London Road, Reading RG1 5AQ, UK)	Strasbourg (France)
July 17-21	VIIth International Symposium on Reactivity of Solids (Dr. R. M. DELL, Executive Secretary, VIIth ISRS, c/o Building 220, Atomic Energy Research Establishment, Harwell, Didcot, Berkshire, UK)	Bristol (UK)
July 22-28	XIVth International Conference on Coordination Chemistry (Dr. C. J. L. LOCK, Chairman of Organizing Committee, XIVth International Conference on Coordination Chemistry, c/o Department of Chemistry, McMaster University, Senior Sciences Complex, Hamilton, Ontario, Canada)	Toronto (Canada)
August 21-25	Vth International Congress on Catalysis (Dr. V. HAENSEL, Chairman of Organizing Committee, Vth International Congress on Catalysis, c/o Universal Oil Products Co., Algonquin Road, Des Plaines, Illinois, USA)	Miami Beach Florida (USA)



September 4-7	IIIrd International Symposium on Carotenoids other than Vitamin A (Prof. C. BODEA, Chairman of Organizing Committee, IIIrd International Symposium on Carotenoids, Ministerul Invajamintului, Institutul Agronomic "Dr Petru Groza", Strada Manastur 3, Cluj, Romania)	Cluj (Romania)
September 4-8	Ist IUPAC Conference on Physical Organic Chemistry (Prof. H. ZOLLINGER, Department of Industrial and Engineering Chemistry, Eidgenossische Technische Hochschule, Universitätsstrasse 6, CH-8006 Zürich, Switzerland)	Crans-sur-Sierre (Switzerland)
1973		
August 23- September 2	XXVIIth International Conference on Pure and Applied Chemistry (Executive Secretary, IUPAC Secretariat, 2/3 Pound Way, Cowley Centre, Oxford OX4 3YF, UK)	Hamburg (Germany)
September 3-7	XXIVth International Congress on Pure and Applied Chemistry (Dr. W. FRITSCH, Gesellschaft Deutscher Chemiker, Carl-Bosch-Haus, Varrentrappstrasse 40-42, Postfach 9075, D-6000 Frankfurt/Main W 13, Germany)	Hamburg (Germany)
September 10-14	International Symposium on Macromolecules (Mr. J. R. RUCK KEENE, Secretary of Organizing Committee, International Symposium on Macromolecules, c/o The Chemical Society, Burlington House, Piccadilly, London W1V 0BN, UK)	Aberdeen (UK)
1974		
March	IVth International Conference on Crystal Growth (Prof. R. R. HASIGUTI, Chairman of National Organizing Committee, ICCG-IV, c/o Department of Metallurgy and Materials Science, Faculty of Engineering, University of Tokyo, Bunkyo-ku, Tokyo, Japan)	Tokyo (Japan)

# CALENDAR OF NON-IUPAC MEETINGS

1971

June 1-4	International Symposium on Deterioration of Lipids (Dr. B. DROZDOWSKI, Scientific Secretary of Executive Committee, International Symposium on Deterioration of Lipids, c/o Politechnika Gdńska, Instytut Chemii i Technologii Organicznej oraz Żywnościowej, Majakowskiego 11, Gdansk 6, Poland)	Gdansk (Poland)
July 5-8	International Symposium on Acetylenes, Allenes, and Cumulenes (Dr. J. GIBSON, Scientific Affairs Officer, The Chemical Society, Burlington House, Piccadilly, London W1V 0BN, UK)	Nottingham (UK)
July 6-9	IVth European Symposium: Food—Progress in Food Process Engineering with Special Consideration of Proteins, Enzymes, and Aromas (GDCh-Geschäftsstelle, Postfach 119075, D-6000 Frankfurt/Main, Germany)	Prague (Czechoslovakia)
July 13-16	IIInd International Symposium on Synthesis in Organic Chemistry (Dr. J. GIBSON, Scientific Affairs Officer, The Chemical Society, Burlington House, Piccadilly W1V 0BN, UK)	Cambridge (UK)
July 18-23	VIth International Symposium on Fluorine Chemistry (Dr. J. GIBSON, Scientific Affairs Officer, The Chemical Society, Burlington House, Piccadilly W1V 0BN, UK)	Durham (UK)
August 16-19	VIIIth Australian Spectroscopy Conference (Dr. J. E. KENT, Department of Chemistry, Monash University, Clayton, Victoria, Australia 3168)	Clayton Victoria (Australia)
August 23-28	IIIrd International Conference on Thermal Analysis (Dr. M. MÜLLER-VONMOOS, Institute for Crystallography and Petrography, Eidgenössische Technische Hochschule, Sonneggstrasse 5, CH-8006 Zürich, Switzerland)	Davos (Switzerland)
August 31- September 3	Xth International Symposium on Free Radicals (Dr. M. PEYRON, Institut national des Sciences appliquees, 20 avenue Albert Einstein, F-69 Villeurbanne, France)	Lyon Villeurbanne (France)
September 21-24	Une réunion sur les Phénomènes critiques (Mr. M. C. TROYANOWSKY, Secrétaire général, Société de Chimie physique, 10 rue Vauquelin, F-75 Paris 5 <sup>e</sup> , France)	Lindau (Germany)
September 27- October 1	EUCHEM Conference on Kinetics of Chemical Elementary Reactions (GDCh-Geschäftsstelle, Postfach 119075, D-6000 Frankfurt/Main, Germany)	Göttingen (Germany)
October 4-9	XVI Colloquium Spectroscopicum Internationale (GDCh-Geschäftsstelle, Postfach 119075, D-6000 Frankfurt/Main, Germany)	Heidelberg (Germany)
October 18-20	Symposium on Trends in Polymer Characterization (Chemical Institute of Canada, 151 Slater Street, Suite 906, Ottawa 4, Ontario, Canada)	Sarnia (Canada)
November 2-4	Scandinavian Congress of Chemical Engineering (Secretariat: Bella Centret, Hvidkildevej 64, DK-Copenhagen NV, Denmark)	Copenhagen (Denmark)

## LIST OF ABBREVIATIONS

ACHEMA	Ausstellungstagung für Chemisches Apparatewesen
AOAC	Association of Official Analytical Chemists
AOCS	American Oil Chemists Society
APPITA	Australian Pulp and Paper Industries Technical Association
BSI	British Standards Institution
CCPR	Codex Alimentarius Committee on Pesticide Residues
CEE	Communauté Européenne Economique
CIC	Chemical Institute of Canada
CID	Comité International de la Détergence
CODATA	ICSU Committee on Data for Science and Technology
COMECON	Council for Mutual Economic Assistance
EUCEPA	European Liaison Committee for Pulp and Paper
FAO	UN Food and Agriculture Organization
FDA	US Food and Drug Administration
IAEA	International Atomic Energy Agency
IAPT	International Association of Plant Taxonomy
IAWPR	International Association on Water Pollution Research
ICRO	International Cell Research Organization
ICSU	International Council of Scientific Unions
IPC	Institute of Paper Chemistry (Appleton, Wisconsin, USA)
ISO	International Organization for Standardization
IUBS	International Union of Biological Sciences
IUGG	International Union of Geodesy and Geophysics
IUPAP	International Union of Pure and Applied Physics
OCS	Organic Coatings Section of IUPAC
OECD	Organization for Economic Cooperation and Development
PPRIC	Paper and Pulp Research Institute of Canada
PRS	Paint Research Station (Teddington, Middlesex, UK)
SCOPE	ICSU Special Committee on Problems of the Environment
TAPPI	US Technical Association of Pulp and Paper Industry
TNO	Toegepast-Natuurwetenschappelijk Onderzoek (Netherlands)
UN	United Nations
UNESCO	UN Educational, Scientific and Cultural Organization
WHO	UN World Health Organization



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